THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[Registered as a Newspaper.]

Vol. XXIV. No. 602.] LONDON, NOVEMBER 24, 1874. [26th Year.] Price 6d.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis—10,000 cubic feet of gas per ton of coal; 26-candle gas; 13¼ cwt. coke per ton of coal.
The London Exhibition in 1851 was lighted with gas made from Ramsay's Cannel.
RAMSAY'S PATENT CONDENSED COKE.
DO. GARESFIELD COKE.

RAMSAY'S FIRE-CLAY ARTICLES.
GAS-RETORTS, introduced 1828. FIRE-BRICK WORKS, established 1804. FIRE-CLAY SANITARY PIPES, CHIMNEY-TOPS, and all Goods made of Fire-Clay. The Fire-Clay is worked from Blaydon Main Colliery, is of excellent quality, and no expense spared in perfecting every article. The FIRE-BRICKS (marked "RAMSAY") are to be seen in all parts of the world, and the Works are the most extensive in the Kingdom.
Manufactories—Derwenthaugh, Swalwell, and Hebburn Quay, near Newcastle-on-Tyne; and London Wharves—Falcon Wharf, No. 30, Bankside; and Honduras Wharf, Cubit Town. Large stocks kept.
Address G. H. Ramsay, Newcastle-on-Tyne.

GENUINE TORBAY PAINT
AND
SPECIAL GASOMETER PAINT
(Mixed ready for use).
FOUR PRIZE MEDALS.
WORKS: BRIXHAM, TORBAY.
These Paints are now used in 100 Country Gas-Works, and by all (but one) of the London Gas Companies, on Gasholders, Scrubbers, Purifiers, &c. They will cover tar effectually. Also used by the Admiralty, War Office, Railway Companies, Founders, &c.
They prevent and arrest rust, and protect iron from the action of water, sulphurous and gaseous exhalations.
The covering powers are considerably greater than those of any other Paint.—*See "Engineer," Nov. 2, 1866.*
STEVENS AND CO.,
London Office, 21, Great Winchester Street, E.C.

PROUD'S
SPECIALITIES IN WOOD
FOR
PURIFIERS & SCRUBBERS
MADE FROM THE BEST QUALITY
OF
WELL-SEASONED PLANKS.
BROOKFIELD WORKS,
103, ICKNIELD STREET EAST,
BIRMINGHAM.

COWEN'S PATENT FIRE-CLAY RETORTS.
JOSEPH COWEN and CO.,
BLAYDON BURN, BLAYDON-ON-TYNE,
Were the only parties to whom a Prize Medal was awarded at the Great Exhibition of 1851, for "Gas-Retorts and other Objects in Fire-Clay," and they were also awarded at the International Exhibition of 1862, the Prize Medal for "Gas-Retorts, Fire-Bricks, &c., for Excellence of Quality."
J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpiece, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.
COWEN'S GARESFIELD COALS.
Coal Office,
Quay Side, Newcastle-on-Tyne.
Jos. Cowen & Co. are the only Manufacturers of Fire-Bricks and Clay Retorts at Blaydon Burn.

JOHN RUSSELL AND CO.,
THE OLD TUBE-WORKS, WEDNESBURY;
AND
THE ALMA WORKS, WALSALL.
Established at the commencement of Gas Lighting.
WAREHOUSES:
69, UPPER THAMES STREET;
COMMERCIAL STREET, SPITALFIELDS;
5, CHARLES STREET, SOHO; and
16, SOHO SQUARE,
} LONDON
35, 36, 37, & 39, GRANBY ROW, MANCHESTER.
J. R. and Co. are the original manufacturers of Wrought-Iron Gas Tubes and Fittings, and Inventors of the LAP-WELDED TUBES for Locomotive and Marine Boilers.
J. R. and Co. make all kinds of Tubes and Fittings for Gas, Steam, and Water; Gun-Metal Cocks, Stocks, and Dies; Galvanized Tubes and High-Pressure Tubes, &c.
Lists may be obtained on application to
69, UPPER THAMES STREET, LONDON.

JOHN BENT & SON,
BELL BARN ROAD, BIRMINGHAM,
MANUFACTURERS OF
WET AND DRY GAS-METERS,
OF
FIRST-CLASS MATERIALS & WORKMANSHIP;
Also, STATION-METERS, PRESSURE-GAUGES, STREET-LAMPS, REGULATORS, &c.
Established 1830.

THOMAS PIGGOTT & CO.,
SPRING HILL, BIRMINGHAM.
MANUFACTURERS OF
TELESCOPIC & SINGLE GASHOLDERS,
CAST & WROUGHT IRON TANKS FOR DITTO,
And Gas Apparatus of every Description.
Marine, Tubular, Cornish, Plain, Furnace, Saddle, and Range Boilers.
Sugar, Saltpetre, and all kinds of Pans.
Roofs, Girders, and Bridges, and General Smith's Work.
London Agent—W. G. DAVIS, 2, Brabant Court, Philpot Lane, E.C.

SCOTTISH CANNEL COAL.
J. & W. ROMANS,
GAS ENGINEERS AND COAL FACTORS,
OF
EDINBURGH and LONDON,
CONTRACT FOR SUPPLYING ANY QUANTITY OF
GAS, HOUSE, and STEAM COAL, and CANNEL;
Also for every sort of Gas Apparatus and Fire Goods.
Messrs. Romans, being lessees of several Gas-Works, have their Cannels tested in the ordinary working process, thus securing for their customers a guarantee beyond mere laboratory experiments.
Analysis, prices, and other information will be forwarded on application to their Offices, 30, St. Andrew Square Edinburgh; and 1, Walbrook, Mansion House, London.

THE
DUKE OF HAMILTON'S
LESMAHAGOW
CANNEL COAL.
AGENT:
JAMES M'KELVIE,
HAYMARKET,
EDINBURGH.

GEORGE GLOVER & CO.,
PATENTEES OF THE
NATIONAL STANDARD GASOMETERS
For the English Government, and for the Government of the Netherlands;
MAKERS OF THE DUPLICATE COPY
Presented by Her Majesty's Government to the French Government;
AND MANUFACTURERS OF
IMPROVED
DRY GAS-METERS,
Warranted to Measure correctly, and not to vary.
RANELAGH WORKS, RANELAGH ROAD, PIMLICO, LONDON, S.W.;
236, GEORGE STREET, GLASGOW; and 15, MARKET STREET, MANCHESTER.

G. G. and Co. have just received the only Medal awarded for Gas-Meters at the Vienna International Exhibition.

SILVER MEDAL, PARIS EXHIBITION, 1867.

LLOYD AND LLOYD,

ALBION TUBE-WORKS, BIRMINGHAM,

MANUFACTURERS OF

WROUGHT-IRON TUBES AND FITTINGS

AND

LAP-WELDED IRON AND HOMOGENEOUS METAL BOILER TUBES.

Boiler-Tube Ferrules, Gun-Metal Gland Cocks, Water-Gauges, Whistles, &c.; Stocks, Taps, and Dies for Screwing, and Gas-Fitters Tools.

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LIVERPOOL: No. 63, Paradise Street. | PARIS: No. 38, Rue du Chateau d'Eau.

MANCHESTER: Barlow's Croft, Chapel Street, Salford. | LILLE: No. 38, Rue Grande Chaussee.

LAMBERT BROTHERS, WALSALL.

ALPHA TUBE & FITTING WORKS

HENRY HOWARD & CO.,

COOMBS WOOD PATENT TUBE-WORKS,

OLD HILL, near DUDLEY,

MANUFACTURERS OF

HOWARD'S PATENT IMPROVED WROUGHT-IRON TUBES,

FOR GAS, STEAM, AND WATER;

Also ORDINARY WELDED WROUGHT-IRON TUBES and FITTINGS,

FOR GAS, STEAM, & WATER, EITHER BLACK, GALVANIZED, OR ENAMELLED.

CORE BARS FOR IRONFOUNDERS, STOCKS, TAPS, AND DIES, IRON COCKS, &c.

VICKARYS AND ROBERTSON,

Late JOHN VICKARY,

ESTABLISHED 1840.

GAS ENGINEERS, CONTRACTORS, IRON AND BRASS FOUNDERS,

WEST OF ENGLAND ENGINEERING WORKS, EXETER.

GASHOLDERS AND TANKS,

Retorts, Retort-Fittings, Condensers, Scrubbers, Purifiers, Station-Meters, Governors, Rack and Screw Valves. Gas and Water Mains always in Stock.

STEAM-ENGINES, EXHAUSTERS, SHAFTING AND GEARING, &c.

GAS-FITTINGS,

Including Chandeliers, Pendants, Hall Lamps, Brackets, Star and Sun Lights of all designs.

WET & DRY GAS-METERS,

Combining most recent improvements in principle and manufacture; upwards of 200,000 already in work, giving highest satisfaction. (A guarantee of five years given with every Meter.)

PLUMBERS WORK, including Lift and Force Pumps; Cocks for Gas and Water and Steam; Brass Fittings.

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ALDER AND MACKAY,

GRANGE WORKS, EDINBURGH,

MANUFACTURERS OF

CONSUMERS IMPROVED GAS-METERS;

IMPROVED DRY GAS-METERS, in Cast Iron and Tin Cases,

OF THE HIGHEST EXCELLENCE,

Warranted to measure correctly, and not to vary.

STATION METERS AND GOVERNORS,

EXPERIMENTAL METERS, PHOTOMETERS, GASHOLDERS, &c.

WHITEHOUSE AND COMPANY, LIMITED,

GLOBE TUBE-WORKS, WEDNESBURY; & VICTORIA TUBE-WORKS, GREAT BRIDGE, STAFFORDSHIRE,

MANUFACTURERS OF

PATENT WELDED WROUGHT-IRON TUBES,

FOR GAS, STEAM, AND WATER;

GAS-FITTERS TOOLS, STEAM COCKS, AND ALL KINDS OF JOINTS.

HYDRAULIC TUBES, CORE BARS, TELEGRAPH POSTS, COILS, &c.

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JOSEPH AIRD,

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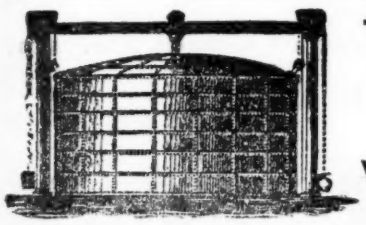
MANUFACTURER OF

PATENT WELDED WROUGHT-IRON GAS, STEAM, HYDRAULIC, GALVANIZED, & ENAMELLED TUBES & FITTINGS.



W. C. HOLMES & CO.,

WHITESTONE IRON-WORKS, HUDDERSFIELD

MANUFACTURERS OF

RETORTS, ANNULAR AND PIPE CONDENSERS,

WROUGHT AND CAST IRON SCRUBBERS, PURIFIERS, GASHOLDERS,

GOVERNORS, AND ALL THE NECESSARY FITTINGS FOR COMPLETING THE ERECTION OF GAS-WORKS.

STATION & CONSUMERS WET OR DRY METERS, STREET & SERVICE MAINS, LAMP COLUMNS & BRACKETS, & WROUGHT-IRON TUBES AND FITTINGS; WROUGHT-IRON ROOFS FOR ANY SIZE OF BUILDINGS.

Sole Makers of B. W. Thurston's Combined Condensing, Scrubbing, and Washing Apparatus,

AND PATENTEES OF THE IMPROVED COMBINED CONDENSING AND PURIFYING APPARATUS SO EMINENTLY ADAPTED FOR EXPORTATION.

REFERENCES TO UPWARDS OF 300 GAS-WORKS.

FLETCHER AND MURPHY,

GARRATT STREET WORKS, OLDHAM ROAD, MANCHESTER;

Manufacturers of

IMPROVED CONSUMERS WET GAS-METERS

IN CAST-IRON CASES,

THE UNVARYING WATER-LINE GAS-METER,

AND

IMPROVED DRY GAS-METERS;

STATION-METERS OF ALL SIZES, with PLANED JOINTS;

GOVERNORS, PRESSURE AND EXHAUST REGISTERS, TEST HOLDERS.

And all kinds of Experimental Gas Apparatus.

GAS PURIFICATION & CHEMICAL Co., LIMITED,

(Successors to JOHN WILLIAM O'NEILL & CO.,)

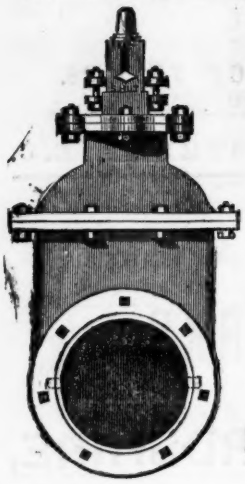
Offices—PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.,

CONTRACTORS FOR GAS PURIFICATION BY OXIDE OF IRON.

The superiority of the material supplied by this Company is generally recognized, and it is now in use in nearly all the London and most of the large Provincial Gas-Works.

JOHN WILLIAM O'NEILL,
SAMUEL H. JOHNSON, } Joint Managing Directors.

C. & W. WALKERS' DOUBLE-FACED GAS-VALVES.



These solidly constructed double-faced Gas-Valves are superseding the old system of the light, single-faced disc, which is too uncertain and unreliable in large bores.

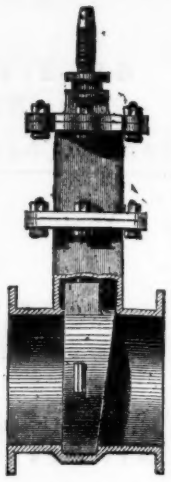
They are guaranteed absolutely gas-tight. They are very massive and rigid, and by improved modes of manufacture they are produced at very little excess in cost over the old light, weak system, which is liable to spring and bend, and become leaky.

The Valve is a rigid wedge of solid cast iron, having two perfectly scraped surfaced facings fitting between the two on the body, which are also surfaced.

A spring in two short halves, and, therefore, not liable to break, is used only for scraping the front facing clean.

The front facing is vertical; the back facing forms the wedge.

At a slight additional expense both flanges are faced to bolt to main-pipes.

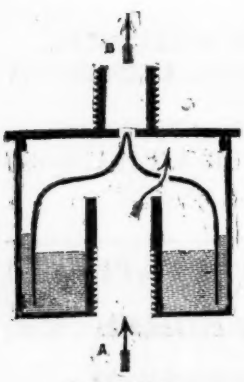


MIDLAND IRON-WORKS,
DONNINGTON, near NEWPORT, SHROPSHIRE;
8, FINSBURY CIRCUS, LONDON.

GIROUD'S PATENT RHEOMETER.

Sole Licensees and Agents for the United Kingdom of Great Britain,

SIDNEY LEONI AND CO.



Sectional View.

Glycerine neither evaporates nor freezes at ordinary degrees of temperature.

Inside a Lamp.

Under a Globe Burner.

The RHEOMETER is a new apparatus of measurement; it is entirely made of "metal," and works "inside a closed vessel." It determines the quantity of gas to be consumed; and this quantity remains unchangeable, whichever be the burner employed, and whatever be the pressure.

ADVANTAGES.

For Domestic Purposes.—Saving of Gas.—Possibility of adopting low-pressure burners, which give as much as "four times more light" than the others, with the same volume.

For Gas-Works.—It is no longer necessary to consider any differences of level, or any variations in pressure. Alterations in burners, or a change of burners, will not affect the consumption. The quantity stipulated by contract is always supplied to all the lamps.

Subscriptions by the hour are no longer a matter of difficulty; in such cases the "sealed" Rheometer replaces the ordinary meter.

For Town Lighting.—The Rheometer is a guarantee that the contract for lighting is duly carried out. Thus, good burners may be adopted, and the lighting thereby improved, without the gas company having any interest in intervening to oppose such a measure.

All Orders should mention what quantity per hour the Rheometer is intended to regulate.

Depot: At the ECONOMIC GAS STOVE COMPANY, 74, STRAND, ADELPHI, W.C.,
WHERE THEY MAY BE SEEN IN ACTION.

Adamas Works: 54 to 66, ST. PAUL ST., NEW NORTH ROAD, N. Offices: 19, GT. GEORGE ST., WESTMINSTER, S.W

One Sample Rheometer sent Carriage Paid to any part of the Kingdom on receipt of 5s. in Stamps.

☞ PLEASE ADDRESS ORDERS TO THE WORKS.

THE THAMES BANK IRON COMPANY,

(Successors to LYNCH WHITE,)

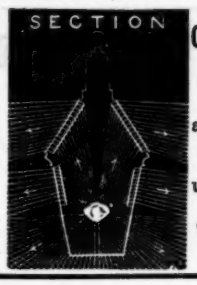
SUPPLY FROM STOCK

CAST-IRON RETORTS, SOCKET-PIPES for GAS or WATER PURPOSES, FLANGE-PIPES for STEAM, RAIN-WATER PIPES and GUTTERS, HOT-WATER PIPES and BOILERS, and all requisite Connexions for same; also LAMP-COLUMNS, LAMPS, WROUGHT FRAMES, WROUGHT-IRON TUBING, &c., &c.

All kinds of Gas-Works Apparatus and General Castings made to Pattern or Drawing.

ADDRESS—

OLD BARGE WHARF, UPPER GROUND STREET, LONDON, S.E.



THE PATENT

CATOPTRIC LAMP

Is now in use in Moorgate Street, Cheapside, and Trafalgar Square, and has been in successful operation upon Waterloo Bridge since Oct. 7, 1871.

T. A. SKELTON, 37, Essex St., Strand, LONDON, INVENTOR AND PATENTEE.

EDWARD E. CROMBIE & CO.,

(Successors to N. DEFRIES & CO.,)

DIANA PLACE, EUSTON ROAD, LONDON,

MANUFACTURERS OF

PATENT DRY TWO AND THREE DIAPHRAGM GAS-METERS,

UPHELD FOR FIVE YEARS FREE OF CHARGE.

PRIZE MEDALS—LONDON, 1851, AND PARIS, 1867.

WILLEY AND FORD,

GAS ENGINEERS,

WORKS: COMMERCIAL ROAD, EXETER,

INVITE THE ATTENTION OF GAS COMPANIES AND OTHERS FOR THE SUPPLY OF

EVERY DESCRIPTION OF GAS APPARATUS.

ENGINEERING DEPARTMENT.

NEW GAS-WORKS erected complete. Plans and Estimates furnished. MAINS, METERS, SERVICES, LAMPS, &c., adapted for Towns of any size. Gas Companies advised on Improvements, Extensions, and Alterations of Works.

GASHOLDERS AND TANKS.

RETORTS and RETORT-HOUSE FITTINGS, CONDENSERS, SCRUBBERS, ENGINES and EXHAUSTERS, PURIFIERS, STATION-METERS, GOVERNORS, VALVES, &c.

METER DEPARTMENT.

They beg special attention to the excellence and superiority of their WET and DRY METERS, several thousand being now in use by many of the largest Gas Companies in the West of England and South Wales. Warranted to measure correctly, and not to vary. Their acknowledged superiority has brought them into general use more rapidly than any Meters hitherto manufactured. A guarantee of Five years tendered with each Meter.

GAS-FITTING DEPARTMENT.

An extensive variety of Choice Designs in CHANDELIERS, PENDANTS, BRACKETS, STAR and SUN LIGHTS, MEDIÆVAL FITTINGS for CHURCHES, &c.

PATTERN-BOOKS and PRICE LISTS furnished.

☞ PLEASE NOTE THE ADDRESS—

GAS ENGINEERING WORKS, COMMERCIAL ROAD, EXETER.

CAFFALL, THOMAS, & CO., LIMITED.

PATENT IMPROVED SEAL

FOR

GAS HYDRAULIC MAINS.

SAVES COAL, RETORTS, FUEL, LABOUR, TIME, SPACE, AND CAPITAL.

PREVENTS STOPPAGE OF ASCENSION-PIPES, DEPOSITION OF CARBON IN RETORTS, THICKENING OF TAR IN HYDRAULIC MAIN.

GIVES MORE GAS PER TON OF COAL, WITH HIGHER ILLUMINATING POWER, SATISFACTION, AND PROFIT TO SHAREHOLDERS AND MANAGERS.

IS STRONG, SIMPLE, EASILY FIXED AND WORKED, AND THOROUGHLY EFFICIENT AT ALL TIMES.

TESTIMONIAL.

Gas-Works, Guildford, Sept. 15, 1874.

GENTLEMEN,—The five retorts fitted with your Patent Moveable Seal for Dip-Pipes, on June 30, have been in constant use since that date, and have worked in a most satisfactory manner.

These Retorts are still quite clean and free from carbon, whilst others not so fitted, after being at work eight weeks, required scurfing, having a deposit of carbon 2 inches in thickness on the inside.

I also find a slight increase in the yield of gas per ton of coal carbonized, although your Patent Seals are fitted to but one-fifth of the Retorts now at work.

As your statements respecting your apparatus are fully confirmed by the results obtained in practical working, I should wish you at once to fix one to each of the ovens at these works, that I may obtain all possible advantage during the coming winter.

Yours truly,

Messrs. Caffall, Thomas, and Co., Limited, 28, Gracechurch Street, E.C. JOS. SHAW, Manager.

MODELS MAY BE SEEN, AND INFORMATION OBTAINED, AT THE OFFICES, 28, GRACECHURCH STREET.

WARNER AND COWAN'S
SELF-REGULATING GAS-METER.

BY LETTERS PATENT

FOR

GREAT BRITAIN,

FRANCE,

BELGIUM,

AUSTRIA,

PRUSSIA,

AND THE

UNITED STATES OF AMERICA.

OPINION
OF
W. RICHARDS, ESQ.,
LONDON,
INVENTOR OF THE DRY GAS-METER.

"Your improvement in the Wet Meter is decidedly the best that has been introduced since its invention; exceedingly beautiful and simple, which renders the instrument mathematically correct, and infinitely more accurate than any means in general usage for the measurement of liquids."

THE PATENTEES ARE PREPARED TO GRANT LICENCES
For the Manufacture and Sale of the above.

APPLICATIONS TO BE MADE TO

THE SOLE LICENSEES AND MANUFACTURERS:

W. & B. COWAN,

ESTABLISHED 1827,

KING HENRY'S WALK,
BALL'S POND ROAD,
NEAR DALSTON JUNCTION TATION.
LONDON, N.

BUCCLEUCH ST. WORKS,
EDINBURGH.

TANGYE BROTHERS AND HOLMAN,

LAURENCE POUNTNEY LANE, LONDON, E.C.,

SOLE MAKERS OF

MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH

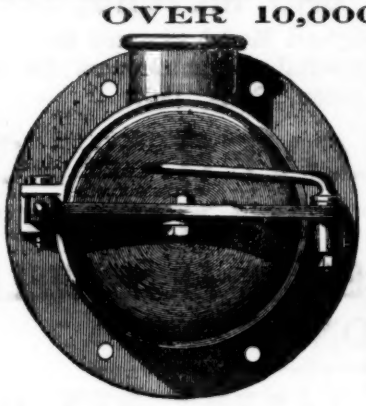
HOLMAN'S PATENT ECCENTRIC FASTENINGS & ANTI-FRICTION CATCHES.

OVER 10,000 IN USE.

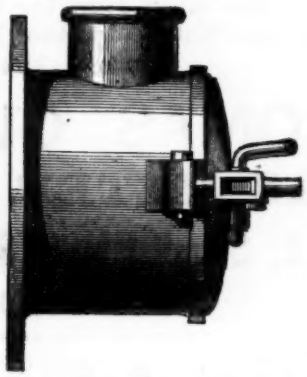
NO LUTING.

LIDS HINGED TO MOUTHPIECES; NO LIFTING ON OR OFF.

NO SCREWS FOR FASTENING.



FRONT VIEW.



SIDE VIEW.

SIMPLE.

ECONOMICAL.

DURABLE.

EFFECTIVE.

NO DUPLICATE LIDS REQUIRED.

These Lids are proved by many eminent Gas Engineers to be the most efficient, saving much time, labour, and expense; are opened and closed as quickly and with as little trouble as an ordinary furnace door, and by their use the Retorts are soundly sealed during the whole period of carbonization.

These Lids are Adopted by the following (among many other) Gas Companies:—

The Gaslight Company, Beckton (where over 2000 are in use).	The West Ham Gas Company.	The Salford Corporation Gas-Works.	The Carmarthen Gas-Works.
„ Gaslight Company, Bow Common.	„ Imperial Gaslight Company.	„ Rochdale Corporation Gas-Works.	„ Merthyr Tydfil Gas-Works.
„ London Gaslight Company.	„ Gas-Works, Arsenal, Woolwich.	„ Liverpool United Gas-Works.	„ Ystrad Gas-Works.
„ Independent Gaslight Company.	„ Commercial Gas Company.	„ Birkenhead Gas-Works.	„ St. Alban's Gas-Works.
„ Phœnix Gaslight Company.	„ Alliance and Dublin Gas-Works.	„ Birmingham Gas-Works.	„ Over Darwen Gas-Works.
„ South Metropolitan Gaslight Co.	„ Edinburgh Gas-Works.	„ Nottingham Gas-Works.	„ Aylesbury Gas-Works.
	„ Manchester Corporatn. Gas-Works.	„ Newcastle-on-Tyne Gas-Works.	„ Cardiff Gas-Works.

The Morton's Lid is made circular in form, that being the most convenient and suitable shape. It can be used for Retorts of any section, by adapting the Mouthpiece casting from the D, oval, or other shape, at the back, to circular in front.

The following important Testimonial has been given:—

THE GASLIGHT AND COKE COMPANY

(*Commonly called the Chartered Gas Company*),

MESSRS. TANGYE BROTHERS AND HOLMAN. *Beckton, North Woolwich, July* 2, 1874.

Gentlemen,—In answer to your inquiry respecting the Self-Sealing Lids, I beg to say that they continue to work well, and I have every reason to be satisfied with them.

I should be very sorry to return to the old system of Luting, and our stokers here freely acknowledge the benefit to them of the new system.

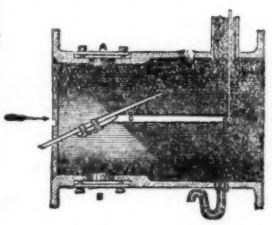
I am, yours truly,

(Signed) G. C. TREWBY.

P.S.—We shall have very shortly about 3000 of your Lids in use.

SOLE MAKERS OF

HUNT'S PATENT EQUILIBRIUM GAS GOVERNOR.



In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown at C on the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.

The principal advantages of this arrangement over the ordinary form of Governor are as follows:—

Its sensitive action prevents oscillation.

It is self-adjusting—*i.e.*, it maintains a steady pressure under variations of inlet pressure or a fluctuating consumption.

The inlet to Gasholder being contracted to the smallest possible dimensions, all danger from leakage through insufficiency of seal, tilting, &c., is entirely avoided.

The valve portion being separate from the holder, it can be handled and fixed like an ordinary Slide Valve direct in the main; and the holder can be placed at any convenient distance immediately above it. The cost is thus materially reduced, and the inconvenience of heavy lifts done away with.

There are no working parts likely to get out of order.

These Governors have been adopted by several leading Gas Companies, among whom are the following:—

The Gaslight Company—a 24 in. at Whitechapel District Station.	The Gaslight Company—a 6 in. at the Gas-Works, Beckton.
„ „ a 36 in. at Goswell Road Station.	The London Gas Company—an 18 in. at the Gas-Works, Nine Elms.
„ „ a 24 in. at „ „	„ „ an 8 in. at „ „
„ „ a 24 in. at the Gas-Works, Beckton.	„ „ a 24 in. at „ „

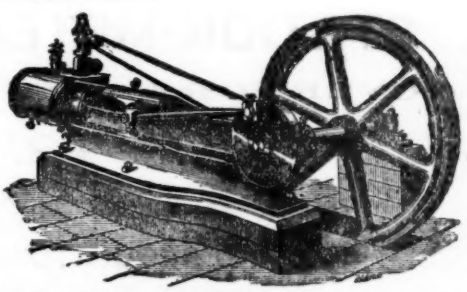
Also at the Gas-Works, Rochdale, Monmouth, Devonport, Cannes, and Mentone (France), &c.

Vienna Exhibition, 1873.—The Grand "Medal of Progress"

HAS BEEN AWARDED TO

Tangye's Horizontal High-Pressure Expansive STEAM-ENGINES.

1200 sold since introduction in December, 1869.



Number	B	C	D	E	G	H	J	K
Nominal Horse Power	2	3	4	6	8	10	12	18
Price of Engine	£32	£38 15	£46	£70	£90	£115	£145	£185
Feed Pump, extra	£3	£3 15	£4	£5 10	£6	£7 10	£8	£10
Diam. of Steam Cylinder	4 in.	5 in.	6 in.	8 in.	9 in.	10 in.	12 in.	14 in.
Length of Stroke	8 „	10 „	12 „	16 „	18 „	20 „	24 „	28 „

These Engines are adopted in Gas-Works at Haggerston (Independent Gas Company), Nine Elms (London Gas Company), Falmouth, Harrow, Jersey, Plymouth, Richmond, Rochdale, Santiago (Chili), &c.

London 1851. New York, 1853. Paris, 1855. London, 1862.

Dublin, 1865.

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

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THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS,

1st, Are a remedy for all the defects of Wet Meters;
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3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON & CO.,

(SUCCESSORS TO SAMUEL CROSLEY,)

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WET & DRY GAS-METERS,

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STREET-LAMP METERS,

AND REGULATORS FOR AVERAGE METER INDICATION.

METERS FOR MEASURING WATER.

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

THE JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, NOVEMBER 24, 1874.

Circular to Gas Companies.

THE parliamentary notices which have now been issued, do not add much to the information we already possessed as to the intentions of the Corporation of the City of London and the Metropolitan Board of Works, with regard to the gas supply of the metropolis. As we were led to anticipate, notices of three Bills have been given conjointly by the Corporation and the Metropolitan Board. If, we take them in the order in which they appear in *The Times*, the first is a Bill to authorize the purchase by compulsion or agreement, of all the undertakings supplying gas within the district of the Metropolitan Board. As regards, however, those whose limits lie but in part within the district of the Board, it is provided that only such parts of the undertakings which come within the district need be purchased. Of course, the dissolution of the companies is provided for, and the purchasing body or bodies seek all the powers necessary for carrying on a gas undertaking. To provide the purchase-money, power is sought to use for the purpose any or all the funds, revenues, and borrowing powers now possessed by the respective bodies, with authority to borrow further moneys and levy additional rates, and, if necessary, to create a new and special stock or stocks. It is further sought to make the Commissioners of Sewers the purveyors of gas to the City of London, but it is also provided that the Corporation and the Board may appoint a committee or committees, who, jointly or separately, may exercise any of the powers conferred by the Act. We need not say more of this Bill, although, as we have said, it is one which might possibly be carried, if the Corporation and the Board were in earnest. But, for the present, we are certain that the two authorities will shirk the responsibilities which would be thrown upon them if the Bill became law.

The next we notice is the Bill authorizing the Corporation and Board to establish competing works; but as the counsel of the Metropolitan Board has advised them that "Parliament never did," and probably never will, "allow a competing supply of gas, of "which the rates are the origin of the capital, and the source "from whence all loss is to be made good," we do not suppose the two bodies will push this part of their scheme. For, of course, in relation to this, the several authorities ask power to pawn their present revenues, borrow further money, and levy additional rates. No more need be said about this Bill.

The third notice is for a Bill to alter, regulate, and improve the quality and illuminating power of the gas supplied to the metropolis, to improve the mode of testing such quality and power, to alter existing rates and charges, to alter profit and rates of dividend, to abolish the right to apply surplus profits in payment of arrears of dividend, and to limit the dividend on borrowed money converted into capital—in a word, to alter altogether the financial aspects and prospects of the gas undertakings. Much might be said about this Bill, which seems to involve a good deal, but which probably will lead to but few changes. The metropolis will have to put up with 14-candle gas, which is, indeed, the best for it. The standard of purity cannot be carried beyond the point arrived at by the Chartered Company, and as regards the mode of testing, we venture to think that that can hardly be improved. Present rates of dividend and profits we do not believe Parliament will be induced to alter, except possibly in the way now supported in part by Mr. Newton, who has adopted the principle advocated in these columns, of dividends according to price. Mr. Newton, however, appears only to approve that part of the plan which would practically fine a company for their misfortunes, and leaves out that part which would reward them for well-doing. In this he obviously differs from Mr. Farrer, who would abolish the limitation of dividend when a low price was charged. Mr. Newton very sensibly considers 4s. as the future normal price, and while this rate lasts he is willing to allow 10 per cent., or, as we prefer to say, maximum dividends. For every increment of 3d. above 4s. he would reduce the dividends by one-half per cent. Thus, if 5s. were charged, the 7 per cent. shareholder would only get 5 per cent. We have before expressed our assent to such an arrangement, if it be carried in both directions, and for every decrement of 3d. an additional profit of one-half per cent. be allowed.

Subject to that modification, we may wish the two bodies success in effecting their proposed alteration. As regards the conversion of borrowed money into capital, which is a great grievance with Mr. Newton, and which the Bill now under notice seeks to regulate, we may remark that the power to do so is conferred generally by the Companies Clauses Consolidation Act, 1845, with no restriction as to dividend. What the Imperial Company has done cannot now be undone, except by an Act of confiscation. Mr. Newton's grievance, we may admit, is legitimate, but it could now only be remedied by a wrong which Parliament will not inflict. At the present day it is provided in every Gas Act—thanks, we believe, to Lord Redesdale—that borrowed money converted into capital shall only carry a maximum dividend of 5 per cent. The power to apply surplus profits in payment of arrears of dividend will, we venture to think, remain unaltered, notwithstanding this action of the metropolitan authorities. Still, if the plan of regulating dividends suggested above were adopted, it would clearly be unnecessary.

It is impossible, in the space at our disposal, to describe and discuss all the points of these Bills, but the foregoing outline of the proposed measures will give our readers a general idea of their scope and character. We pass to another *quasi* public measure, of which notice has been given. The origin does not appear on the face of it, but may readily be guessed. It proposes to amalgamate all the really metropolitan companies into one, with a view to the subsequent transfer of the united undertaking, by sale, to the Corporation of London and the Metropolitan Board, or either of them; or to a body of commissioners to be appointed by the Act. In either case the consideration for the transfer is to be the issue of perpetual annuities, equal to maximum statutory dividends. In this way the transfer would be effected without the payment of any capital sum. Borrowing powers are still needed, and these are provided for by authorizing the Public Works Loans Commissioners to advance money on the undertakings. A further very considerate provision is to empower the Lords Commissioners of Her Majesty's Treasury to guarantee the annuities and the interest on loans. The Bill proposes the supply of gas of one uniform quality and at one uniform rate. It further suggests all

sorts of regulations, and the appointment of public officers to see them carried into effect. This short description of the measure will suffice for the present.

When we look to see the position taken up by the companies, in face of the action taken by the local authorities and others, we are sorry to say that we cannot discern any evidence of that unity of purpose which is especially desirable in the present crisis. On the contrary, there would appear to be some dissensions, fraught with peril to the common cause. There is time, however, between now and the meeting of Parliament, for a common understanding to be arrived at, and we hope that when the time comes the companies will present a united front. The Chartered Company have given notice of a measure which is, in some respects, remarkable. It seems to boldly confront the Corporation and Board of Works with the proposal to take some of the lands these bodies have selected for new works, and employ them for the extension of the works of the company. It goes on, following Mr. Farrer's suggestion, to ask for power to borrow money to an unlimited extent; and then, like the last-mentioned Bill, proposes to transfer the undertaking to a body of commissioners appointed by Government, who are to grant shareholders perpetual annuities equal to maximum dividends; or, if Parliament should so determine, to make the transfer to the Corporation and Board of Works on the same terms. Mr. Norwood Earle will be flattered at seeing his suggestion adopted by the leading metropolitan company.

The Chartered Company, we know, have unlimited powers of amalgamation. The Imperial and South Metropolitan neglected to obtain such powers in 1869; but the former are now seeking authority to amalgamate with any one, or all the companies within the metropolitan area, as defined by the Metropolis Gas Act, 1860. We shall presently inquire with what company or companies the Imperial are in a position to amalgamate if they choose, and are allowed to stand aloof from a general northern combination. We pass now to the mention of a Bill, notice of which has been given by the Phœnix Company, for power to unite with all the other companies south of the Thames, including some of those supplying beyond the strictly metropolitan limits. What we once called a "half-hearted" attempt has been made before to bring about some such combination as is now aimed at. It fell through partly for want of earnestness of purpose, and partly from the opposition of local authorities, in the interest of the consumers of the South Metropolitan Company. But the position of things is now changed, and amalgamation being the game of the authorities, the Phœnix Company may carry their point if they work at it with a will. The question of terms, so far as concerns the South Metropolitan Company, will be a delicate one. This company stands to the Phœnix in much the same relation that the Great Central stood to the Chartered; but to-day what we may call a guaranteed preference maximum dividend would never be allowed. The company must go into the combination "scot and lot," and that may seem a hardship to the shareholders. As regards the consumers of the company, it is clear that the levelling up of price, of which we once spoke as a possibility, is now imminent.

The Commercial Company have given notice of a Bill, one chief object of which is to effect amalgamation with the Ratcliff. Another is to get land at Bromley for additional works, and, as a matter of course, it is desired to obtain an increase of capital. What may be the fate of this measure, after the warning given by Mr. Farrer, it is impossible to say. The Board of Trade, it is true, do not rule the two Houses of Parliament; but still, if any determined opposition were offered, no matter by whom, the weight of the Board of Trade might turn the scale against the company. Mr. Farrer has plainly intimated his opinion that the Commercial and Ratcliff should join the Chartered, and there is much to be said in favour of such a combination. Mr. Newton, who entertains what we might almost call a passionate hatred of the Chartered Company, is, as our readers will see in another column, violently opposed to union with this company. We venture to think, however, that the amalgamation will, somehow or other, be brought about; and if it should, we do not believe that the interests of the East-end gas consumers would be in the least prejudiced. They will get their gas at 3s. 9d., so long as it is possible to sell it at the price. The rates have been kept down in Mr. Newton's district by the reserve-fund of the Commercial, and he knows very well that the first effect of this Bill, if passed, will be the levelling up of the Ratcliff to the Commercial Company's price. There is a choice, however. The Imperial Company's new works are convenient, and this company is bidding for amalgamation. That the Commercial Company will be empowered to erect new works, when there are mains passing through their district capable of supplying all the needs of the locality, is, we think, doubtful—that is, if serious opposition be raised. But the opposition must come from quarters in which it would appear ungenerous and unkind.

We have exhausted our space, and can only now sum up the argument. The Board of Works and Corporation of London are not in earnest in their desire to purchase the undertakings at a fair price. They know they will not succeed with their competing Bill, and would be scared out of their wits if, by accident, it should pass. Their wish is to carry the regulating Bill, under the impression that it would depreciate the value of gas property. The Board of Trade have clearly pointed out to the companies the way to make their position secure, and that is the consolidation of interests by amalgamation; and we still hope that, before Parliament meets, the companies will have arrived at a common understanding, and will unitedly be prepared with a definite policy.

The Vestry of Kensington having had under consideration for some months the adoption of the average meter system to the public lamps, have adjourned the further discussion of the matter for four months. We fear there is floating in many vestrymen's minds a vague idea that, under the new order of things, which they expect to see inaugurated, public lamps will be supplied with an unlimited quantity of gas at very little cost. These gentlemen are deluding themselves. If the works should come into Corporation hands, the ratepayers would most assuredly find the lighting-rate heavier than before.

As we explained a week or two ago, when noticing the provisions of the last Dublin Gas Act, there are two public gas examiners in that city, one of whom can fine the gas company, while the other cannot. Strange to say, the examiner who can fine, reports the gas much above the standard, while the other reports it much below. The cause of the difference is, perhaps, not far to seek; and we would recommend the two examiners to come to an arrangement, and make their tests simultaneously. In that event, the observations and results should differ but little.

The Corporation of Nottingham have had presented to them by their Gas Committee a long report, describing the condition of the works when taken over, and the plan they propose for the future management of the undertaking. There are one or two things in the report to which we shall allude on another occasion, but we may mention to-day that the committee report the works as in a highly efficient state. This is but simple justice, for two of the stations, those at Eastcroft and Basford, are among the very best appointed works in the kingdom. The space for our "Circular" is exhausted, but we must quote the last sentence of the report:—"The Gas Committee anticipate that the acquisition of "these works will, if they are managed with energy and ability, "prove *a boon not only to the ratepayers, but to the consumers of "gas.*" Thus at Nottingham also the ratepayer is to be first considered, and the consumer may fare as he can.

It may interest some of our readers to know that the Corporation of Ryde, with the sheriff at their doors, have paid Mr. Thornton Andrews's claim and costs. The ratepayers of Ryde will note that for an original claim of £194 they have had to pay £613! That portion of the law costs which Mr. Andrews must have to pay, and other expenses, will, we imagine, leave him a very small reward for his services to the Corporation. The moral of this contemptible story, for gas engineers, is, that when employed by a Corporation, they should see, first, that their engagement is under seal, and, second, that they contract with the right parties.

The Town Council of Cardiff are about to apply for power to purchase the gas and water works.

Water and Sanitary Notes.

The services of a medical inspector who cannot discover the cause of an outbreak of fever can be of very little value to the Local Government Board. We read, therefore, without surprise, that the epidemic at Lewes has been traced to the water supply. It is gratifying to read, at the same time, that such an outbreak can never occur again, if the directions of the inspector be carefully carried out. We hope the company will rigidly obey them; but as epidemics of this kind only recur at distant intervals of time, we fear we shall never learn the true value of the protective measures recommended. The fever at Over Darwen is happily abating, a few frosty nights, as the medical officer reports, having had a very favourable effect.

Vice-Chancellor Malins has removed a prohibition of his court which prevented the Corporation of Birmingham from proceeding with their sewerage scheme. The original injunction was obtained at the instance of Sir Charles Adderley, whose object was to stop the admission of the sewage of Birmingham into the river Tame. As, however, that could not be entirely prevented, the injunction only went the length of forbidding the admission of more sewage than was passing at a certain date. The fact that the Corporation have now excellent defœcating works at Saltley, and that the mortality in the borough is rising, have induced the court to remove the prohibition to construct new sewers, and Birmingham

will, in the course of a year or two, have a very complete system of sewerage.

Speaking of Birmingham, we may mention that the Corporation are about to apply for power to purchase the water-works. It is not intended that the authority asked for shall be immediately exercised. The notice is given to prevent delay if, at a future time, the Town Council and the water company should come to an agreement.

The Town Council of Hull have been debating what salary they should give to their new water engineer, who is to be restricted from engaging in private practice. They have decided on a salary which, with residence, coals, &c., shall constitute an emolument equal to £450 a year. An amendment recommending a more liberal remuneration was rejected almost unanimously. We have no hesitation in saying that the stipend fixed upon is much too small, and, considering what engineers services now fetch in the market, the Corporation of Hull can hardly expect to obtain the assistance of a first-class man.

The Board of Health of the rising town of Mexborough are about to apply for power to raise £10,000, to carry out a scheme of water supply. The project is to sink a well or wells, under the direction of Mr. Brundell, of Doncaster.

We regret to see that serious defects are alleged in the works recently executed for the conveyance of water from the Lintrathen reservoir to Dundee. As the reputation of an engineer is somewhat seriously concerned in the matter, we can only quote what the alleged defects are:—

1. Pipes ¾ inch instead of 1 inch in thickness across the bridge over the Isla at Lintrathen.
2. Curves being taken by straight pipes in 12-feet lengths, "wholly unsuited for such dangerous and important parts of the work."
3. The pipe laid over the bridges over the Isla in such a manner as to render it impossible to put down a second pipe when required, notwithstanding that the bridges were intended to carry a double line of pipes.
4. The pipes laid only 18 inches below the level of the turnpike near Auchterhouse, so as to be unsafe and not sufficiently protected from frost.
5. Culverts built under the railway so low that the pipe cannot be repaired in case of breakage.

Over and above these special defects, some of which have been, and others are now ordered to be remedied, the members of the Water Commission who went out lately to inspect the works were amazed to witness the manner in which the pipe is carried down one precipice of 220 feet, considerably more than the height of the Old Steeple, and up another at the first crossing of the Isla, about the safety of which great doubts were naturally entertained.

Ingleton and Settle appear to be very favourably situated for the distribution of a good supply of very excellent water; but the source has been neglected, owing, as is usually alleged, to the want of consideration on the part of the landlords, who practically tell their tenants to get water where they can. In accordance with this advice, the inhabitants of a district which is, no doubt, fitly named "Poverty," resort to a beck, the water of which is often charged with impurities. They have had their outbreak of typhoid fever, and that has stirred the local authority into action. The inhabitants have now consented to the application of the authority for power to borrow £1000 of the Public Works Loan Commissioners, for the construction of necessary water-works.

WATER LEGISLATION IN 1874.

The *Airdrie and Coatbridge Water-Works Amendment Act* is to enable the Airdrie and Coatbridge Water Company, who have now a capital of £32,080, to raise additional funds to the amount of £40,000, carrying the usual borrowing powers, and with the customary limitation of dividend. The Act further confirms an agreement made by the company with the Caledonian Railway, who have superseded the Company of Proprietors of the Forth and Clyde Navigation, the particulars of which are only interesting to the parties concerned.

The *Belfast Water Act* is to enable the Belfast Water Commissioners to make some important additions to their works, in order to keep pace with the growing necessities of their district. For the purposes of the Act the commissioners are empowered to borrow £120,000, to be paid off, as usual, under the directions of the Local Government Board for Ireland. A further provision for Carrickfergus, whose supply will be interfered with, is provided for, and the commissioners get necessary powers for regulating the supply, and increasing the water-rates in Belfast.

The *Chester Water-Works Act* authorizes the Chester Water-Works Company, who have already raised a share capital of £48,000, and borrowed £12,000, and spent a considerable further amount on the undertaking, to raise additional capital to the extent of £24,000, carrying ordinary borrowing power, and limited, as usual, with regard to dividend. The Act further gives the company necessary and reasonable powers for the prevention of the waste of water, and the general protection of their interests.

The *Cupar Water Act* is to enable the commissioners of Police of that borough to furnish a supply of water to Cupar and places adjacent. For this purpose the commissioners are authorized to borrow £25,000. The domestic water-rate is not limited by the Act; but the public rate is not to exceed 6d. in the pound. The undertaking is to be as nearly as possible self-supporting. The commissioners are to estimate the costs yearly, and make rates accordingly, and any surplus profits are to go in reduction of rates in the succeeding year. Of course, the commissioners have power to make regulations, some of which are of a stringent character.

The *Dublin Corporation Water-Works Act* is intended to relieve the Corporation from fulfilling some of the conditions imposed upon them, with their own consent, by the Act of 1861. It seems that under that Act owners of property in some districts might demand a supply of water, and it might be inconvenient or physically impracticable for the Corporation to furnish it. Such districts are now excluded from the operation of the Act, but the Corporation are, at the same time, bound not to oppose any company who are willing to undertake the responsibility of overcoming the inconvenience and the physical impracticabilities. Further, the Corporation having neglected to collect their water-rates, have been compelled to borrow money, and this Act authorizes the payment of interest on the temporary loans they have obtained from their bankers.

The *Dundee Water (Additional Powers) Act* is simply to authorize deviation works now in progress, and to provide for additional money, "in consequence of the great and rapid increase in "the price of iron and other material, and in wages." The additional money asked for is £150,000.

The *Edinburgh and District Water-Works (Additional Supply) Act* authorizes the construction of the works so often referred to in our columns, and empowers the trustees to borrow £380,000 for the purpose. In this case, too, the undertaking, after the excellent plan generally adopted by Scottish local authorities, is to be made self-supporting. The rates are to be levied annually after due estimate. The "domestic" rate is not limited, limited, but that on shops, warehouses, &c., is restricted to 3d. in the pound. Warehouses and granaries, &c., in which water is never required, are not to be rated. The public water-rate is not to exceed 1d. in the pound. Other provisions are only of local interest.

The *Fairfield (Derbyshire) Local Board Water-Works Act* authorizes the Local Board to purchase the undertaking of the Fairfield and Buxton Water-Works Company, Limited, for £2000, and to expend £8000 on new works, power being given to borrow only £10,000. Stringent provisions for regulating the supply are granted. The domestic rate is limited to 6 per cent. on annual rateable value, with the usual provision as regards extra water-closets and baths. No public rate is authorized, but surplus profits may be expended for the public benefit of the inhabitants.

The *Fylde Water-Works Act* authorizes the Fylde Water-Works Company, with a present paid-up capital of £75,000 and borrowed money to the amount of £15,000, to raise additional capital to the extent of £65,000, the dividend on which is limited as usual. The additional capital carries the ordinary borrowing power. The object of the new capital is the construction of additional works, which are, of course, described in the Act.

The *Hartlepool Gas and Water Act, 1867, Amendment Act* authorizes the Hartlepool Gas and Water Company to construct additional water-works. No new capital is granted.

The *Horbury Local Board Act* empowers the Board to supply water, which they are to purchase in bulk from the Soothill Local Board, who, as our readers will remember, are enabled to take more than they at present want from the Corporation of Halifax. This Act gives ordinary powers, and fixes the domestic rate at 7 per cent. on annual value, to be paid in advance. The Board may borrow £10,000 for water purposes.

The *Hythe Improvement and Water-Works Act*, among other things, authorizes the Corporation of Hythe to extend the water-works, formerly in the possession of Improvement Commissioners, but by this Act vested in the Corporation. The Act confers the ordinary but stringent powers, and authorizes a domestic rate of 6 per cent., with additional charges for a bath and extra water-closets. It also gives the Corporation power to enter any premises on which a well or pump suspected to yield water unfit for use exists; and if, on analysis by a competent analyst, the water is declared unfit for use, the Corporation may fill up or cover the said well, which is not to be opened or used again without the consent of the Corporation.

The *Leeds Corporation Water Act* extends the limits of water supply, and authorizes the Corporation to borrow a further sum of £300,000 for water purposes. The Corporation are further empowered to fund the whole, or any part, of the money previously borrowed, or now authorized, with interest not exceeding 5 per cent. Some necessary provisions are also made for the prevention of the waste of water.

The *Lymm Water Act* authorizes the North Cheshire Water Company to sink a well, and construct additional works for the supply of Lymm and Oughtrington. The capital of the company is now to be £12,000, and they may borrow to the usual extent. Ordinary powers of regulation are granted, with rates about as usual.

The *Nottingham Water-Works Act* extends the limits of the Nottingham Water-Works Company, and enables them to raise additional capital. The present capital of the company is £250,000, and the borrowing power £40,000. By this Act the company are empowered to raise £100,000 additional capital, the dividend on which is limited to 5 per cent. Borrowing power to the extent of one-fourth of the capital is, as usual, granted.

The *Padiham Water Act* authorizes the Local Board of Padiham and Hapton (Lancashire) to purchase the undertaking of the Padiham Water-Works Company. The consideration is annuities of 8 per cent. per annum, on a capital sum of £12,556 10s., which may be redeemed in the usual manner. Power is given to the Board to borrow £3000 to carry on the concern.

The *Shipley Local Government Act*, among other things, authorizes the Local Board to acquire additional land, and extend their water undertaking. It is provided that the Board shall, when so required, sell any part of their plant to any other sanitary authority within their limits. Power is given to borrow £10,000 in respect of the water undertaking.

The *Skipton Local Board of Health Act* empowers the Board to acquire the undertaking of the Skipton Water Company. The consideration is the payment of £10,773 12s., to be divided among the ordinary shareholders, and a sum not exceeding £7000 to be divided among the preference shareholders. The Act appears to give the Board power to borrow £40,000 for the purposes of the undertaking; but, strange to say, provides that they shall not borrow more than £30,000 without the consent of the Local Government Board. All necessary powers are given for the winding up of the company, and to the Board for carrying on the undertaking.

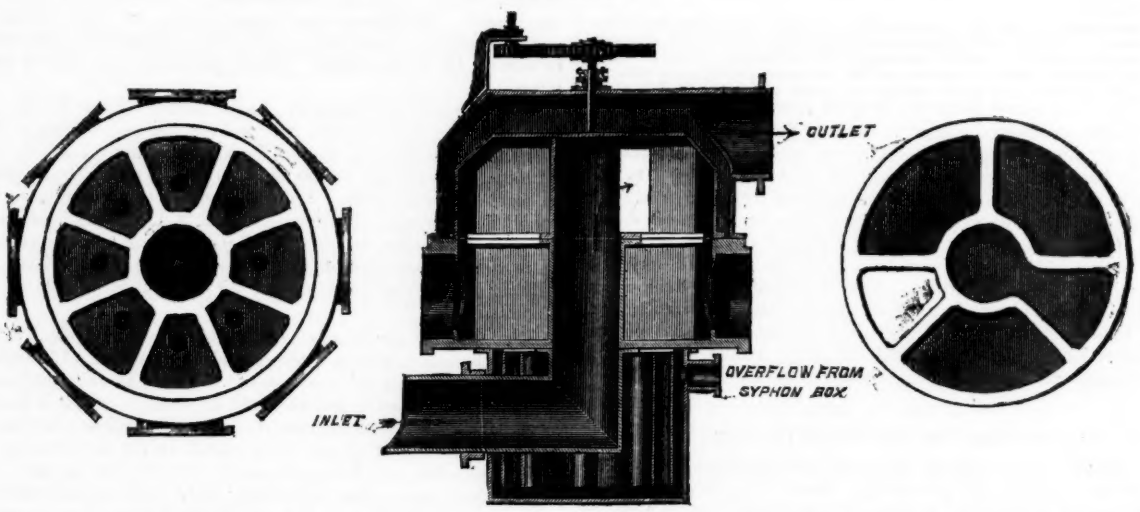
The *Wakefield Water-Works Act* empowers the Wakefield Water Company to raise £100,000 additional, the dividend on which is limited to 7 per cent. or 6 per cent., according as the shares are ordinary or preference. The capital carries the usual borrowing powers. As the company will be in Parliament again next session, we will not further refer to their affairs. The most noticeable feature of this Act is a section which requires the company, in laying pipes within the borough of Wakefield, to place them whenever practicable under the flagged footpaths.

The *Wrexham Water-Works Act* extends the limits of supply of the Wrexham Water-Works Company, and authorizes the construction of new works and the raising of additional capital. Before the passing of this Act, the company had power to raise a capital of £21,000, and to borrow £4750, and nearly all this has been raised and expended. This Act authorizes the company to raise £20,000 additional capital, the dividends on which are limited as usual. Besides this, it confers some ordinary general powers on the company.

A TREATISE ON THE SCIENCE AND PRACTICE OF THE MANUFACTURE AND DISTRIBUTION OF COAL GAS.

XL.

PURIFIERS.



The above drawings show a sectional elevation of Messrs. Walker's centre-valve, and plans of its seat and cover suitable for working a set of four purifiers, three always in action, and one always out of action for changing. These centre-valves have been constructed especially for the largest gas-works. The valve itself, as will be seen, is protected inside the safety cover, which forms the outlet for the purified gas. The partition surfaces of the body are never exposed to settlements of dirt or carbon, as already stated, the valve having surfaced bars between its partitions, which keep the facings of the body always covered. Each chamber in the body has its separate drain-pipe, taking off any condensation into the general syphon beneath.

For working the valve the centre spindle passes through the safety cover. Upon the spindle is keyed the spur-wheel, which has four recesses, similar to a railway turn-table. Upon the bracket that supports the pinion there is a weighted stop-catch not shown. When the man wishes to change a purifier, he releases the spur-wheel by pressing down the weighted lever stop-catch with his left hand, and then by two or three rapid turns of the pinion with his right hand the cover inside slides the required distance, the weighted catch-lever drops into the recess, and stops the valve exactly in its required position.

It has been the practice of Messrs. Walker to get up the surfaces of these large centre-valves entirely by *scraping*, after they have left the planing and turning machines. About seven years ago two were made for the Manchester Corporation Gas-Works, for two sets of large purifiers, having pipes 22 inches bore, and it was remarked at that time among mechanical engineers that they were the largest *scraped* surfaces got up for any purpose in mechanical engineering. These centre-valves have since that time come into use in most of the largest cities of Europe, and in the new gas-works at Beckton.

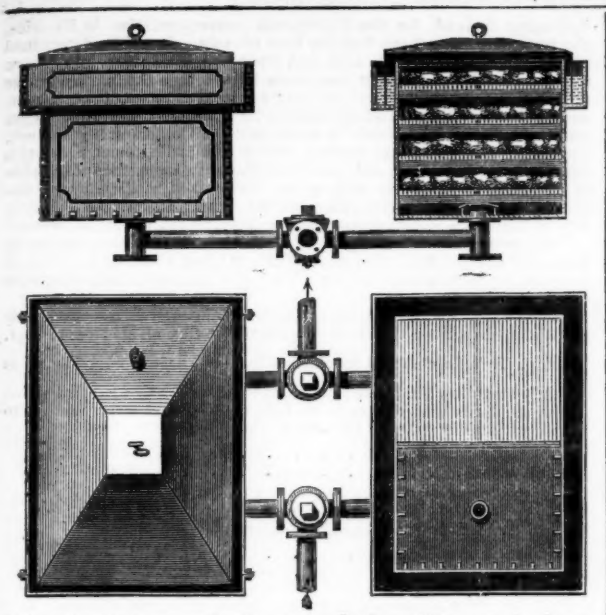
The following table represents, under ordinary average conditions, the maximum daily and hourly make of gas, as compared with the yearly production; and, assuming our suggestions to be correct, the active area of purifiers required, corresponding with the production.

Annual Production. Cubic Feet.	Maximum daily. Cubic Feet.	Maximum hourly. Cubic Feet.	Active Surface Area of Purifier. Feet.
2 million ..	12,000 ..	500 ..	90
5 „ ..	30,000 ..	1,250 ..	225
10 „ ..	60,000 ..	2,500 ..	450
20 „ ..	120,000 ..	5,000 ..	900
50 „ ..	300,000 ..	12,500 ..	2,250
100 „ ..	600,000 ..	25,000 ..	4,500

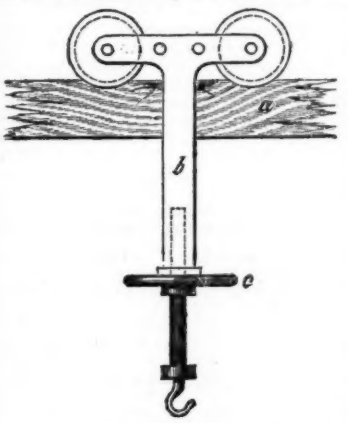
No gas-works, even of the most limited capacity, can be properly conducted with less than two purifiers. Each of these is subdivided and connected in such a manner that the gas enters at the bottom and passes through the oxide, lime, sulphate, &c., descending through the material in the other compartment, one purifier being in action whilst the other is shut off, ready for recharging. In this case, on account of the large cubical capacity of the purifier, an advantage is obtained, as the gas in its transit is almost in a state of repose, the most suitable condition for depositing its impurities; on the other hand, in consequence of the few layers of material it has to pass through, the gas is not generally capable of being so well purified as with larger apparatus.

From the foregoing table we find, for a production of 2 million feet of gas per annum that 90 feet active superficial area of grids are required, so that two purifiers, each 6 feet by 4 feet internal measure, and having four tiers of grids, are necessary for a work producing the quantity specified.

The engraving on next page represents an elevation and plan of two purifiers suitable for such a work, arranged with two three-way cocks—a system very frequently adopted in small establishments, on account of the simplicity of the connexions, and because the cocks,



being placed close to each other, are under immediate control. Sometimes the flat-surface valve replaces the three-way cock; but whichever may be employed in this instance is of very little consequence. By the arrangement in question it is hardly possible for an error to occur, as, by changing the position of the cocks, the gas is shut off from one purifier, and the other is brought into action.



The means of lifting the lids of these apparatus is represented by the accompanying engraving, and consists of a beam or plank, *a*, 9 inches by 3 inches, placed edgeways, having both its ends secured either in the wall or otherwise. On this run the two double-flanged wheels, which are supported by the frame, *b*, and at the lower part of this is fitted a female screw, fixed to, and actuated by, the hand-wheel, *c*. The vertical screw is provided at its lower extremity with a hook working in a swivel, so that by turning the hand-wheel in the proper direction the hook can be raised or lowered. By this means the cover can be lifted to the necessary height, when it is rolled out of the way, so that the workman can enter the purifier to remove the foul material and recharge the apparatus.

Various methods are adopted for holding down the covers of the purifiers. Sometimes it is effected by two bars, which extend across them, passing into eyes on each side, or by short levers, which hold the cover at the four angles, and in some instances by large hinges, one part of which is attached to the tank, the other fitting into an eye or stud on the covers. The tap on the lid is for the purpose of permitting the passage of the air either when lifting or lowering the cover.

Sometimes, although rarely, the purifiers are combined in a set of three, and actuated by a central valve, but only considerations of the most rigid frugality in construction, could induce any engineer in the present day to adopt this plan, because the extra capital required for the fourth purifier is so small when compared with the advantages it offers, as to leave no cause for hesitation in its adoption. In all small or medium-sized works, the arrangement of the four combined purifiers is unquestionably the best and most perfect; but in very large establishments, experience has demonstrated the necessity of having them in sets of six or eight, according to the judgment of the respective engineers.

Following the first rule suggested, which approximates that generally acknowledged and adopted, we find that a work producing 20 million feet per annum would require four purifiers, each 9 feet square, with four tiers of grids and 9-inch connexions; and that for a work producing 50 millions, four purifiers, each 12 feet square, with five tiers of grids and 12-inch connecting-pipes would be necessary. But with a production of 100 millions, we commence to depart from the established rule, as the size of the connexions no longer correspond with the area of the purifiers. In this case they would be required 15 feet square, whilst the pipes of communication would be but 14 inches in diameter.

As the purifiers increase in magnitude a very marked deviation from the established rule is made. Thus we find, in works of the most modern construction and of the largest description, that barely 4 feet active surface for the purifying material is allowed per 1000 feet maximum daily production, whilst the cubical contents of the apparatus and the thickness of the layers of purifying material are considerably increased.

This, as we can understand, arises from the same law by which the delivery of pipes is increased according to their augmented diameters. It is in like manner that an extensive superfice of grids, as compared with a smaller, will permit of deeper layers of material. There is also the further consideration, that the pipes in this case are diminished in size, compared with the superfices of the purifiers. And this would lead to the conclusion that no really definite rule can be established for large purifiers under the varied maximum productions of gas. However, so far as we have related, their requisite capacities for all practical purposes are sufficiently accurate.

The tanks of purifiers are generally constructed of cast iron, the size and form of the plates varying with their dimensions, the thickness also being regulated accordingly; those of small dimensions being about half an inch thick, increasing to about three-quarters of an inch for the largest sizes manufactured. The plates are provided with 2½-inch flanges, with bolt-holes cast therein, and strengthening brackets about 6 inches apart, and are put together with bolts and nuts, the joints being made with iron cement. In some continental works, for the sake of frugality, this part of the purifiers has been constructed of brickwork. This is, however, very false economy, as, by a slight additional expense, the tanks can be obtained of cast iron, which, in the event of displacement for the extension of works or other causes, will sell for a considerable portion of their original cost, whereas those of brick, when demolished, possess no value.

When constructing large purifiers of 30 feet square, Mr. Bower has dispensed with the cast-iron bottom plates, and substituted brickwork or masonry rendered with hydraulic cement, this afterwards having a coating of pitch to obviate the action of the impurities of the gas on the cement. By this means considerable economy is effected, particularly when, as in the case of foreign gas-works, the expenses of transport and customs duties are high. As will hereafter be shown, in the construction of gasholder-tanks, cast iron for their bases is frequently superseded by concrete, rubble, masonry, &c., set in hydraulic cement. Of course, such method of construction is very advisable in those cases where the purifiers are made of great dimensions, or the gasholder-tanks of large diameter, and not likely to be displaced for many years.

The water-lutes in purifiers for small works are generally about 9 inches deep and 5 inches wide. Under these conditions the gasholders are required to be counterbalanced, or otherwise arranged so as to give but slight pressure. In some gas-works, where heavy telescopic gasholders exist, the water-lutes require to be 18 or 24 inches deep. In the erection of purifiers, the foundations of the separate vessels being constructed in their proper positions in relation to each other and the valve governing them, and duly levelled, the plates forming the base of each purifier are laid in their respective places with the flanges uppermost, bolted together temporarily with a few bolts. The connexions are likewise temporarily placed in conjunction with the central valve, the side plates being supported on wedges attached, and care is requisite to make all the joints, both of the bottom and sides, of uniform thickness. All the parts being properly fitted, and the spaces between the plates being uniform, the joints are then made, with iron cement well driven in along the seam by a hammer and caulking-iron, and the bolts and nuts placed, those used temporarily being removed for the purpose of completing the joint, when the whole of the seam is filled with cement. As the soundness of the vessels at these parts depends on the manner in which the work is executed, too much care cannot be devoted to it. The borings should be cast iron—those of wrought iron do not oxidize with sufficient rapidity for the purpose—and the cement applied whilst in a heated state, just after mixture.

The covers or lids of purifiers are generally of wrought iron; in some few instances only have we seen them of cast iron. The latter, although more durable, by their excessive weight require extra labour continually, the expense of which more than counterbalances the economy thus effected. The lids of purifiers should be never less than No. 12 gauge in thickness, and if galvanized, and having a good coat of pitch applied to the metal when hot, both inside and out, will last 10 or 15 years. As a means of preserving the sides of the lids, as well as to assist in obtaining the gas in a state of purity, the water of the lutes should be changed repeatedly.

(*To be continued.*)

Communicated Article.

THE FUTURE OF GAS LIGHTING.

What is it likely to be?

He must be a bold man who would try to invest gas lighting with the faintest glimmer of ideality. Who among outsiders think or care to know anything about the processes and machinery by which gas is manufactured and distributed, or the conditions which regulate its price? Among the thousands and hundreds of thousands who all their lifetime have enjoyed the benefits of gas, and who would think it a hardship to be, against their will, deprived of its use, only a few persons know more than what they may have read or been told, that gas-works are dirty places, with a great deal of smoke and steam and disagreeable odours connected with them. Nor is it to be expected that it should be otherwise. Of the millions of railway passengers, who of them ever attempt to dive into the myteries of locomotives and tenders, switches and points, shunting and signalling? But with all this indifference to some things, it is not so with respect to others. One of the birth-privileges, so highly valued by all

classes, is freely exercised. Rightly or wrongly, cause or no cause, the ancient custom of grumbling is well sustained.

It is impossible to say how many generations it requires to kill prejudices. We are accustomed to say, "Let them alone, they will die out." Perhaps they may, but some of them are a long time about it. Gas lighting has entered its third generation-period. It has not only kept up with, but distanced, many other inventions of its own age; and yet, great as has been its successes, it has never shaken itself free of nagging fault-finding.

There is never any difficulty in getting up a case against a gas company. "The gas is not pure," "it is deficient in illuminating power," "there is not pressure enough," "it is too dear," "the profits of the company are too great;" and so, if not one of these it is another; and if not exactly that, something very much like it. Is that all? No. It is admitted, although a little hesitatingly, that "the gas is good and cheap." What next? "There is not enough of it." Anything more? Yes; just another ring out at one of the changes: "gas good," "cheap," "a good supply." What now? "My bill is greater than before the price was reduced. I have not used more gas, and I know it is wrong." Who can give an answer to that?

As with other manufacturing, commercial, and financial undertakings, it is to be expected that in the management of gas companies many errors have been committed which experience only can correct and prevent. So, also, in common with all things dependent on skill and foresight, gas lighting, in all its departments, is susceptible of improvements. But these are distinct from another of its phases—namely, that gas companies should be abused and subjected to legislative restrictions in realizing and appropriating profits upon capital, whilst banking and other companies, manufacturers, and private traders are applauded for managing their respective businesses successfully, and are not restricted as to profits by any such prohibitions. This seems hard to understand, and harder to explain.

For a long time gas lighting in the metropolis has been in a state of disquietude. Looming in the distance, from all points of the horizon, at times distinctly, at other times obscurely, there have been indications of coming changes. Be they for better or worse, they are necessary. Imminent or not, they are inevitable.

Looking at the amount of capital employed in carrying on the metropolitan gas-works, their area of operations, the number of consumers, the annually increasing demands for gas, and the unsatisfactoriness of recent capricious and hasty legislation, is it anything to be wondered at that dissatisfaction exists and is freely expressed? Acts of Parliament, Blue-Books, orders and regulations, and hundreds of other documents relating to gas—the capital, profits, and dividends, the supply, the qualities, the prices, and the purity—are more like materials for the witches' cauldron than directories for conducting commercial undertakings.

The utterances of the oracle at the Board of Trade* are wrapped in mistiness. It must be expected. We must wait, and try to wait patiently, for clearer revelations of official secrets.

For the present we must go on with guesses and conjectures, to learn, probably, that not one of them was right. It is certain that something will be said, and it is fair to conclude that something will be done. Those of us in the dark must bide our time. Whether the metropolitan gas companies are to have the cold hands of the Imperial Government laid upon them; whether they are to be subjected to partial or complete control of newly-created municipalities; or whether, by driving or drawing together the companies by gentle (?) compulsion or voluntary co-operation, a uniform system of supplying gas is to be established, is something to think about and talk about—and no more.

Changes in the metropolis, whatever they may be, will affect the provinces; quickening pulsations already throbbing in the largest cities and towns, and thence passing to the smaller, until that which only lately was exceptional will become the dominant rule—the acquisition by municipal and other public authorities of the gas-works in their respective localities.

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Nov. 19, 1874.

* Letter of T. H. Farrer, Esq., Nov. 11, 1874.

Correspondence.

THE TEST-ACID QUERY.

SIR,—It was my intention, on the appearance of the extract from Mr. Bannister's book in the JOURNAL OF GAS LIGHTING, to send you a few observations relative to test-acid, but pressure of business caused me to delay, and finally to forget, to do so. When in the country, I saw, at the end of last week, a copy of the JOURNAL, containing Mr. Hunt's letter, which brought the matter again to my mind, but there was too little time to send you a communication for your last issue.

I have been interested in the preparation of test sulphuric acid since the year 1857, but, until about six or seven years ago, I took no heed of the gravity of the mixture, as my custom was to mix strong sulphuric acid with water in the proportion of 1 lb. to the gallon, and then to test the dilute acid by neutralizing a given volume with carbonate of soda, or by determining the quantity of sulphate produced on the addition of chloride of barium, and afterwards adding more acid to the dilute acid, if needful, to render it of such strength as to contain 16 ozs. H_2SO_4 in the gallon. At last, however, the error in the statement respecting gravity struck my attention, but I did not think the matter important enough to write about, although I told some gas managers who were buying acid of A. Wright and Co. (who, from 1857, have sold acid of the true strength for testing ammoniacal liquor) of the error. The acid sold by A. Wright and Co. was for years apparently satisfactory alike to vendors and purchasers of liquor, but, with an increasing demand for the liquor, and consequent rise in its price, the buyers seem to have insisted that its value should be determined by the use of 10 per cent. acid, and some companies, as I know, have acceded to this. In one or two cases I have been the innocent cause of disputes by supplying acid of the true strength to vendors of liquor, who, unknown to me, had been making for themselves and using 10 per cent. acid. In a list issued by A. Wright and Co., about a year since, I specified two strengths—namely, 1063·5 and 1068·2—and added this note:—"The first mentioned acid is of the true strength, and consists of 1 lb. of pure sulphuric acid, sp. gr. 1848, mixed with sufficient distilled water to measure one gallon at 60° Fahr. The second acid consists of 1 lb. pure sulphuric acid, sp. gr. 1848, mixed with 9 lbs. water."

Your correspondent, "Alpha," and also Mr. G. Livesey, appear to think that the gravities of mixtures of H_2SO_4 and water may be arrived at by simple calculations; but such is not the case, as the following facts will prove:—

The volumes of equal weights of fluids are, of course, inversely as their gravities or densities; therefore the relative bulks of acid of 1846 gr. (to adopt Ure's figures) and water must be $\frac{1000}{1846}$ or ·542 to 1. Hence, as correctly stated by Mr. Livesey (so far as mere calculation goes), a gallon of test sulphuric acid composed of 1 lb. H_2SO_4, with water enough to make up one gallon, should contain—

Sulphuric acid	0·542 parts.
Water	9·458 ,,
Theoretical volume	10·000 parts.

While the weights must in the above mixture be—

Sulphuric acid	1·000 lbs.
Water	9·458 ,,
Theoretical weight for one gallon	10·458 lbs.

And this divided by 10 (the weight in pounds of a gallon of water) gives a theoretical gravity of 1045·8; but experiment effectually disposes of conclusions so arrived at. I made a mixture of—

Sulphuric acid (H_2SO_4), 700 grs. or	54·17 septems.
Water, 700 × 9 grs. = 6300 or	900·00 ,,
Theoretical volume of mixture	954·17 septems.

But, when cooled to 60° Fahr., it really only measured about 935 septems, thus showing a contraction in volume of about 2 per cent., or 0·1 per cent. in excess of the contraction due according to the gravity of such mixture by Ure's table. In order to make up the volume to a decigallon (1000 septems), I was obliged to add about 64 septems of water. Hence the decigallon consisted of 964 septems or 6748 grains of water and 700 grains of acid, together weighing 7448 grains, which, divided by the weight (7000 grains) of a decigallon of water, gave the gravity as 1064. Further experiments, in which the strength of the mixtures were determined by the sulphate produced on the addition of chloride of barium to a given volume of the dilute acid, led me ultimately to fix upon 1063·5 as the gravity at 60° Fahr. The relation of the true volume of such acid to the theoretic volume must be $\frac{1045·8}{1063·5}$, or as 981·57 to 1000.

Thus, while the volume of acid (H_2SO_4) which must be added to a given volume of water, in order to produce a dilute acid containing a certain per centage by weight of H_2SO_4, may be readily calculated, it is apparently impossible to predicate the volume of the produced mixture, and therefore its gravity. A few examples will show this. Sulphuric acid solutions of the per centage strength by weight given in the following table, must contain—

—	10 per Cnt. Acid.	30 per Cnt. Acid.	50 per Cnt. Acid.	90 per Cnt. Acid.
H_2SO_4	·541	1·6251	2·703	4·874
Water	9.000	7·0000	5·000	1·000
Theoretical volume	9·541	8·6251	7·703	5·874
Ditto, specific gravity	1048·2	1159·4	1298·2	1702
Actual specific gravity per Ure	1068·2	1218·4	1388·4	1807
Relation of actual to theoretic volume	981 to 1000	951 to 1000	935 to 1000	942 to 1000

It will be observed that there appears to be no regular contraction in volume; for while the difference between the actual and theoretical volume is with the 50 per cent. acid nearly 7 per cent., it is with the 90 per cent. acid but little over 6 per cent. Such are the evidences afforded by experimental facts and (as I believe) correct reasoning, and I put these statements forward with the hope that they may help to clear away any confusion of understanding as to what is or is not the test-acid which is volumetrically correct. At the present moment persons are using volumetric instruments (alkalimeters), and utterly ignoring and neglecting the primary principle or condition upon which they are based—namely, that the testing acid should contain 16 ozs. of H_2SO_4 in one gallon.

Ten per cent. acid, of course, makes ammoniacal liquor appear *below* its real strength and value, and certainly every vendor of liquor *ought* to know its actual strength, and indeed, if possible, the absolute quantity of ammonia contained in it, although the sale price may not be affected by such knowledge. If buyers only now obtain a fair profit by the purchase of liquor the strength of which is under-estimated to the extent of nearly 7 per cent., it is quite certain that they will not give the same price per butt for liquor the strength of which is rightly estimated. Practically, it matters little by what standard the liquor is sold, so that there be *one standard*, and that the price realized be such as to be just alike to vendor and purchaser, affording the latter, in fact, a fair and sufficient profit, after all the costs of carriage, manufacture, risks, and contingencies have been duly taken into account.

55, Millbank Street, Westminster, Nov. 17, 1874. F. W. HARTLEY.

SIR,—I have read Mr. George Livesey's contribution in reply to my letter signed "Alpha," but I cannot say that his explanations have altogether dispelled that "foggy envelope" with which he would have us

believe this question was mysteriously surrounded, and I trust we shall be favoured with some reasons for adopting his mixture in preference to one which could be denominated 10 per cent. acid, without which we should hesitate to accept even Mr. Livesey's announcements as gospel.

Before proceeding to the question at issue (what is a pound of H_2SO_4, sp. gr. 1845°), I shall merely advert to several inaccuracies which occur in Mr. Livesey's letter, so that the question may be cleared of some more of the "fog" with which it has been surrounded.

In the first paragraph of Mr. Livesey's letter I am told that I was correct in stating that sulphuric acid having a specific gravity equal to 1068·2 could neither be designated "10 per cent. acid by weight or measure," which was what I was showing was the case; and in the fourth I am told to dismiss "10 per cent." and "liquid pounds" and "specific gravities" from my mind, "and look at the question in a common-sense manner."

Now, just let us look at Mr. Livesey's "common-sense" views of this question.

With the first paragraph of his letter I agree. The second begins with the passage, "The end in view is to ascertain the number of ounces" (what kind of ounces?) "of SO_3 required to saturate a gallon of liquor." I presume Mr. Livesey really means "that the end in view is to ascertain the number of ounces of (H_2SO_4) of specific gravity of 1845° required to saturate a gallon of liquor," for Mr. Livesey must be aware that sulphuric acid having a sp. gr. = 1843 is not anhydrous, as it contains only 79 per cent. of SO_3.

Again, he further tells us that Mr. Bannister was "right in the main." Now, the question only involves the solution of three things—specific gravity, per centage, and a clear understanding as to whether a fluid pound, or 16 ounces by weight, was the correct method of estimation. Mr. Livesey states that Mr. Bannister's rule neither stated the one nor the other correctly. How, then, can Mr. Bannister be both "right in the main" and entirely wrong at one and the same time? This does not look like "common sense."

Now, what is Mr. Livesey's rule?

"I have for many years prepared the test-acid here, a pint at a time, using 2 ounces (what kind of ounces?—I presume from the specific gravity he means by weight) concentrated sulphuric acid." This is certainly not a very clear way of stating the matter; but that there may be no doubt in the matter (weight), the specific gravity is further on stated to be equal to 1045·8. I think Mr. Livesey will find that the ·8 should be a ·6; but this is not very material.

For 1845 : 16 :: 1728 : 14·985

And 277·274

$$14{\cdot}985 \times 1845 = 27{,}647{\cdot}325$$

$$262{\cdot}289 \times 1000 = 262{,}289$$

$$289{,}936{\cdot}325$$

$$\text{And } \frac{289{,}936{\cdot}325}{277{\cdot}274} = \text{sp. gr. } 1045{\cdot}6.$$

Which means that this mixture contains 5·42 per cent. (by measure) of sulphuric acid, and 94·58 per cent. of water; while sp. gr. 1068·2 would mean that 8 per cent. by measure of acid is mixed with 92 of water.

For 1068·2 − 1845 ✕ 68·2

1068·2 − 1000 776·8

845·0

And 845 : 100 :: 68·2 : 8·07.

Which specific gravity must have resolved itself to the "end in view," as this, we have been informed, is the test applied to liquors, which, if compared with 10 per cent. acid, would certainly take the wind out of some London liquors.

Now, I would rather believe that Mr. Bannister was misunderstood than followed, and I do not doubt but that his rule was—Mix a *fluid* pound of H_2SO_4 of sp. gr. 1845 with 9 lbs. of water, the specific gravity of which mixture would equal 1084·5, and to which the appellation "10 per cent. sulphuric acid of sp. gr. 1845" would correctly apply, which mixture could be made most accurately by weighing as well as measuring these proportions.

For commercial and other reasons, it is highly desirable that uniformity of measurement should prevail, as these discrepancies can only lead to a misunderstanding between the parties who are most interested in obtaining a correct standard for measurement and comparison.

I therefore ask again—would a fluid pound of acid not be a more convenient measure than a pound weight?

Nov. 19, 1874. OMEGA.

SIR,—It is very good of Mr. George Livesey to enlarge upon Mr. Bannister's text, animated by a desire to pierce the "fog," by turning upon us the full bright light of his benignant genius. And

> While he explains what seems most clear
> So clearly that it seems perplexed,

it is impossible not to admire the ease with which, by the exercise of his convenient "common sense," he can make a clean sweep of such things as "10 per cent." and "specific gravities"—subjects which often prove stumbling-blocks in the paths of ordinary mortals.

But all are not so gifted as the past president of the British Association of Gas Managers, and there are probably a few who, like myself, still consider these matters of some slight importance. For this reason I should be glad to hear from Mr. Livesey how, by any possibility, he can, except upon paper, obtain from his acid so low a specific gravity as 1·045; since I find that, owing to the contraction of the mixture, it takes nearer 9·63 lbs. to make up the gallon, instead of 9·45, as stated by him. Nor do I understand his allusion to "SO_3," since it is the hydrated, and not the anhydrous, acid with which we are dealing. These, however, viewed in the light of Mr. Livesey's "common sense," are probably trifles.

Mr. Livesey says that "to *measure* the liquor and *weigh* the acid would be inconvenient." Doubtless it would; but who has ever proposed such a thing? Certainly not I. I measure both liquor and acid, and apply the test in exactly the same way that Mr. Livesey does, the only difference between us at this stage being that, whereas he uses the same measure for both alkali and acid, I have a separate one for each, the acid measure bearing, as I have previously stated, the same proportion to ten pounds of the acid as the liquor one does to a gallon, and divided, of course, into 16 parts. This I maintain to be the correct method of applying 10 per cent. acid, as against that recommended by Mr. Bannister; and there does not appear to me to be anything in its application at all beyond the comprehension of the meanest intelligence. When, therefore, Mr. Livesey says that "Mr. Hunt will see that his laudable desire to deal exact justice between buyer and seller may be met by more simple and effectual means than those adopted by him," my reply is that I can see nothing of the kind, but rather that Mr. Livesey, to judge from his observations, has most unaccountably failed to understand what my method really is.

Mr. Livesey tells us that he never troubles himself about the specific gravity of his resultant acid, which, indeed, is apparent enough. Now, I do not always find it easy either to procure, or to retain when procured, the concentrated acid of the exact strength, owing to the property it possesses of absorbing moisture from the air; consequently, I look upon as indispensable that operation which Mr. Livesey can afford to neglect. It is unsafe, in my opinion, to rely upon the rough and ready, when better means are at hand.

One word in conclusion as to 10 per cent. acid. It is prepared with quite as much facility as any other, being simply a mixture of one ounce by weight of concentrated acid (sp. gr. 1·848) to every nine fluid ounces of water. Its proportions are thus clear and definite enough, devoid of fractions being 1 and 9 by weight; whereas "pound to the gallon" is 1 and about 9·63; moreover, its specific gravity is well known, and vouched for by the highest chemical authorities. Each operator will, of course, determine for himself which to adopt; some may be attracted by the apparent symmetry (if I may so term it) of "pound to the gallon;" for my part I prefer that which is real to that which is only apparent, and shall, therefore, continue to use the "10 per cent." as the simplest and most reliable method.

Birmingham, Nov. 21, 1874. CHAS. HUNT.

MANUFACTURE OF SULPHATE OF AMMONIA.

SIR,—The manager of the Bodmin Gas-Works is certainly entitled to the thanks of those who, like himself, are the managers of small gas-works, for drawing their attention to the fact that it will pay to manufacture small quantities of sulphate of ammonia, and he would further benefit his brethren by furnishing the following information:—

1. What size boiler does he use, and how long does it take to work off a charge?

2. Must any quick or slaked lime be added to the ammoniacal liquor before boiling, and, if so, in what proportion?

3. What size saturating-tank does he use, and what proportion of acid and water?

4. Must *all* the ammoniacal liquor in the boiler, or only a portion of it, be forced over into the saturator; if the latter, how is the right quantity to be ascertained?

5. How are the lids of the boiler and saturator to be secured, so as to prevent the escape of steam from the one and sulphuretted hydrogen from the other?

6. Does he find it necessary to use a separate vessel to cool the liquor on crystallizing, or will the saturating-tank be sufficient for that purpose?

7. What are the respective costs of boiler and saturator? for £60 seems a considerable outlay for a small affair.

In the JOURNAL of July 18, 1871, No. 490, is an admirable article on this subject, by Mr. James Eldridge (Richmond), and some interesting observations thereon by Mr. Stout, of Boston, Mr. Baker, Mr. Anderson, and others, but I cannot glean from the article in question—

What ought to be the relative sizes of boiler and saturator, and the relative proportions of acid and water used in the latter?

In other words, supposing the boiler to hold 200 gallons of ammoniacal liquor, 12° Twaddel—

What size and shape ought the saturator to be, and what quantity of acid and water will be required to work off that quantity?

I presume the saturator must be shallow, to prevent a back pressure on the steam coming from the boiler, otherwise it appears to me to be necessary to fasten down the lid of the boiler, to prevent the escape of the steam, and to compel it to mingle with the contents of the saturator.

Should this meet the eyes of Mr. Eldridge or either of the gentlemen before referred to, perhaps they will kindly give the information sought for by A COUNTRY MANAGER.

SMALL GAS-WORKS AND THEIR PURIFIERS, ETC.

SIR,—A great deal of your space is taken up weekly by gas engineers and others who write articles, &c., upon gas-works of large magnitude, small works being almost entirely overlooked. But many readers of your JOURNAL are managers of country gas-works, and they, I think, demand a little attention now and then. The men to whom I refer may certainly find occasionally a few lines from which they can learn lessons, but this occurs very seldom; while most of the articles or letters only too often make them feel as though they grasped at the stars and stuck in the mud. I have headed this letter with one subject which I opine is one often perplexing to country managers, and mainly because of want of purifying *space*, it so frequently happening that the body of the purifier is only made for present consumption, instead of future increase being taken into consideration. Why not make them large enough to admit of purification by oxide of iron as well as lime, lime being so great a nuisance in small towns, villages, &c., and in many places can hardly be got rid of even as a gift? In some works I am acquainted with, the managers (who are expected to do all manual labour) have in winter to empty and clean the purifier about every other day, or their gas becomes foul. Does not this entail far more work on the man than necessary? and is it not very easily remedied? Can any of your numerous writers who are so fond of contributing for the benefit of large gas managers, &c., do a little for the "lesser lights" in the gas world?

A LESSEE OF SEVERAL SMALL WORKS.

KILMARNOCK.—FIRE AT THE GAS-WORKS.—Some alarm was excited in the neighbourhood of the Corporation Gas-Works, Kilmarnock, in the forenoon of Thursday last, by fire breaking out in the tar-tank above the retort-house. Flames issued from the iron roof, and dense volumes of black smoke enveloped the locality. The fire continued a considerable time, while the tar was being slowly run out of the tank, but fortunately it was unattended with any serious results. The origin of the fire is unknown.

Legal Intelligence.

COURT OF CHANCERY.—Thursday, Nov. 19.

(*Before Vice-Chancellor* Bacon.)

ATTORNEY-GENERAL *v.* THE CORPORATION OF BIRMINGHAM.

Mr. W. Pearson, Q.C., and Mr. Cozens Hardy appeared for the corporation; Mr. Eddis, Q.C., appeared for the Attorney-General.

Mr. Pearson said in this case he had to move, on behalf of the Corporation of Birmingham, for permission to construct sewers in a number of streets in the borough, notwithstanding the order made at the relation of Sir C. Adderley, in July, 1858, the order to be without prejudice to the rights of the relators and plaintiff under the order made in the cause in March, 1871, or the sequestration directed to issue in pursuance of that order; the costs to be taxed and paid by the defendants. There would be no opposition to the motion, provided the court was satisfied that the order might be made. Before 1851, when the Birmingham Improvement Act was passed, the sewerage system of the town consisted of a number of small drains or sewers, which carried the sewage into the River Rea and Hockley Brook, which bound the borough on each side. The town stood on rising ground, between the river and the brook. Under the provisions of the Improvement Act, the corporation commenced constructing two main sewers, one parallel with the river, and the other parallel with the brook. Those sewers were ultimately discharged into the River Tame. That was the best system to adopt at that time; but in the course of time the river became greatly dirty, and proceedings were taken in 1858 by Sir C. Adderley, for the purpose of restraining them from creating a nuisance. An injunction was granted, and it was that injunction which they wished to have dissolved. The effect of the order was to limit the construction of sewers in the town; they were unable to open any fresh main, or branch, or public sewer into either of the two main sewers. It was impossible to empty the sewers any other way, and it was equally impossible to make the sewage run uphill. Further proceedings were taken in March, 1871, to restrain the corporation from discharging sewage into the Tame, and an injunction was granted, followed by a sequestration. That, it was not intended in the least to disturb. The defendants had been for a long time engaged in erecting gigantic works at Saltley, for the purpose of collecting the sewage and deodorizing it, after which pure water only is allowed to run off into the river. There was one circumstance, however, he ought to mention, and that was that in an extraordinary flood the works were not sufficient to prevent the "storm water" going into the river Tame, and they were now constructing further works with a view to stop that. There was another information filed against the corporation at the relation of Davenport and others, which was discharged at the last motion day, the works having been so completely successful that no nuisance now arose of any kind. It only remained to call attention to the circumstances under which it was asked that the injunction of 1858 might be varied, so that the corporation might construct the additional sewers necessary. Since 1858 the town had greatly extended itself, and there were a large number of streets which had no sewers at all. The council had great difficulty in dealing with those streets, and they viewed with some alarm a gradual rise in the death-rate, which they attributed to the want of drainage. At the present time the death-rate was 27 in the 1000, while the normal rate was not more than 23. The evidence in support of the motion was furnished by Mr. Hayes, the town-clerk; Mr. Till, the borough surveyor; and Dr. Hill, the medical officer of health, jointly. A correspondence was opened up with Sir Charles Adderley, and it was pointed out to him that the injunction prevented the completion of the sewering, that it was causing a serious increase in the death-rate, and that if the request of the corporation was granted there could be no danger to the fouling of the river, because they had new works capable of dealing with a much larger quantity of sewage than that which would be added. Mr. Till, the borough surveyor, stated that the streets referred to, commencing with Adam Street and ending with Westbourne Road, are public highways in the borough, and are not sewered, or are only partially and insufficiently sewered. The total length of the sewers required in such streets is 16,810 yards, and the gross estimated cost of the construction thereof is £18,370, which sum, if the proposed sewers be constructed, will have to be defrayed by the council. In addition to that sum, the council will also have to make compensation to owners of property for carrying several lengths of sewers through private lands. The council are willing and desirous to incur this cost in the interest of the public health of the borough, if the court should be pleased to sanction the construction of sewers in the said streets. In his judgment such sewers were absolutely necessary for the proper drainage of those streets, all of which are densely populated, and also for the protection of the health of the inhabitants in such streets. The streets commencing with Allcock Street and ending with Charles Arthur Street have not been declared public highways, and the greater portion of those streets are not sewered. The want of sewers therein is much felt by the dense population residing in such streets. Very pressing applications have been made to the Town Council, urging them to take the necessary steps to cause sewers to be constructed therein. The owners of property in those streets are very numerous, and cannot agree amongst themselves to execute the sewerage works required to be done therein, and there are no means of causing such works to be completed, other than by exercising the powers conferred on the council by the Birmingham Improvement Acts and the Sanitary Acts. The cellars of many of the houses being below the surface of the ground, the drainage accumulates therein, and is from time to time removed by means of pumps on to the surface of such streets, eventually finding its way through sewers in other streets to the sewers outlet at Saltley. In the removal of the stagnant water from the cellars, and its passage along the surface of the unsewered streets, very foul gases are given off, and a great nuisance thereby created. Speaking from his experience as surveyor of the borough for 17 years, and an intimate knowledge of all the streets referred to, and of the sewerage works of the borough, he said that the construction of the proposed sewers in the streets referred to was absolutely necessary, and would only to a very slight extent increase the quantity of sewage discharged at Saltley into the river Tame; he also said that the completion of sewerage and other works of street improvement in those streets which had not already been declared highways would result in the periodical and proper cleaning of such streets, and that much of the filth and refuse which was then washed therefrom into the existing sewers in public highways, and thence to Saltley, would not be conveyed into the sewers at all, but be removed by the officers of the corporation to places of deposit at a distance from the town. Dr. Hill stated that the most calamitous deterioration of health was due to the want of proper drainage; and, unless the source of the disease was swept away, several were likely to become epidemic. The learned counsel expressed the hope that the evidence was sufficiently conclusive to induce the court to concede his request.

Mr. Eddis said he had only one observation to make, and that was that now a much larger quantity of sewage was to be thrown down, there would require to be larger works to prevent overflow. His client must have his interests protected now that he was conceding the corporation that which they asked for.

The Vice-Chancellor said the order might be made, but great care must be taken in drawing it up, so as to preserve the rights granted by the court to the relator. The corporation must take such measures as to prevent a nuisance arising from overflow, and the strictest care must be taken to preserve the rights of the parties.

Friday, Nov. 20.

(*Before Vice-Chancellor Sir* Richard Malins.)

In re the Eupion Fuel and Gas Company, Limited.

On this petition being called on to-day,

Mr. Glasse, Q.C., said he had amended the petition, as stated last week, and believed he was now entitled to take it as an unopposed petition to wind up.

Mr. Higgins, Q.C., said he opposed it.

Mr. Glasse: Who for?

Mr. Higgins: For the company.

Mr. Glasse could not understand how Mr. Higgins could be instructed on behalf of the company.

Mr. Higgins said he must renew his motion on behalf of Mr. Samuel Gurney Fry for an order of the court expunging the scandalous matter from the petition, of which he had complained on the last occasion.

The Vice-Chancellor: It has been expunged.

Mr. Higgins: No; it has only been struck out by having a red line drawn through the allegations complained of. We are entitled to have every word of it expunged under an order of the court.

The Vice-Chancellor expressed the opinion that he was bound to accept the petition as amended.

Mr. Higgins said in that case he must ask leave to serve notice of motion on the petitioners to have those passages expunged, the motion to come on with the petition.

The Vice-Chancellor said he had seen in the newspapers of that morning that the question affecting the directors of this company, now before the City authorities, had been adjourned for the eleventh time. He certainly thought it would be better for all parties to have no more litigation until that question had been disposed of. He thought the matter had better stand over.

Mr. Higgins said persons were going about trying to get people to bring forward claims against the company, and to support the petition, and every time fresh counsel would appear instructed for that purpose.

The Vice-Chancellor asked if any one now appeared in support of the petition.

Mr. Pearson, Q.C., Mr. Romer, and Mr. Alexander said they appeared to ask for a winding-up order.

After some further discussion,

Mr. Glasse offered, if there was any difference between amending the petition, and expunging, to do the latter with the sanction of the court.

Mr. Higgins thereupon said he must have his costs. This gave rise to a further discussion, which was ultimately settled by the Vice-Chancellor stating that he would, by consent, treat the allegations complained of as expunged, and decide as to costs when he heard the petition.

Mr. Glasse now renewed his application for a winding-up order, saying he was entitled to take it as unopposed. Mr. Fry was no longer a shareholder in the company, and had no right to oppose it.

Mr. Higgins said he appeared for the company to oppose.

Mr. Glasse disputed the fact of Mr. Higgins appearing for the company, and asked who he was instructed by.

Mr. Higgins: I am instructed by Mr. Stacpole.

Mr. Glasse: He is the solicitor of Mr. Aspinall.

Mr. Higgins: And you have chosen to select Mr. Aspinall to represent the company.

Mr. Glasse said the solicitors to the company were totally different people. He denied the fact of the petition being opposed by the company.

Mr. Higgins said it was not the habit for the court to doubt the propriety of the statement made by any counsel as to whom he appeared for.

The Vice-Chancellor said Mr. Higgins was instructed by solicitors who took upon themselves to appear for the company, and, of course, he could not inquire whether they had authority to do so. He must assume he was rightly instructed, and the court must do the same, until the contrary was shown.

Mr. Higgins observed that his honour's observation was not quite correct, because the solicitors who instructed him did not take upon themselves to represent the company; but they did so under an order of the court, because the petitioners had obtained an order that service of the petition on Mr. Aspinall should be deemed good service on the company.

The Vice-Chancellor: That is so.

Mr. Higgins further said that he must now ask for an order directing the petitioners and their solicitors to attend in court to be cross-examined. He would undertake not to be more than ten minutes.

The Vice-Chancellor said he could not make any such order at present. The petition would come on in due course as an opposed petition, and when it came on, if a proper case were made for cross-examination, and it appeared to him that the cross-examination could advantageously take place in court, he would order it to stand over for that purpose.

Owing to the length of other business, the petition was not reached, and accordingly stands over to the next petition day.

COURT OF EXCHEQUER.—Thursday, Nov. 12.

(*Before the* Lord Chief Baron *and Barons* Cleasby *and* Amphlett.)

ROMFORD LOCAL BOARD OF HEALTH *v.* HOPE.

Mr. Prentice, Q.C., and Mr. Halls appeared for the plaintiffs; Mr. Murphy, Q.C., and Mr. Charles for the defendant.

At the Chelmsford Spring Assizes this action came on for trial. It was a claim by the Local Board of Romford for a sum of £600, due from the defendant, for one year's rent of a farm, called Britton's farm, in the parish of Hornchurch, held under a lease, dated May 16, 1870, which farm had been purchased by the local board for the purpose of utilizing thereon the sewage of Romford. A cross action was set down for trial at the same assizes, in which action Mr. Hope sued the board to recover £20,000 for damages alleged to have been sustained by him by reason of a breach of covenant on their part in non-delivery of the quantity of sewage contracted for on the farm. At the trial the court suggested an arbitration, under a provision in the agreement between the parties, and ultimately an arrangement was come to by which a verdict was entered for the plaintiff in each action, subject to a special case to be settled by Mr. Meadows White. The case was now referred to the court on the following questions submitted by the arbitrator:—"1. Whether in the action, *The Board against Hope*, the verdict should be entered for the plaintiffs or for the defendant; and, if for the plaintiffs, then whether for the full amount reserved by the lease or for any less amount. 2. If for any less amount, then upon what principle the abatement should be assessed. 3. Whether in the action, *Hope against the Board*, the verdict should be entered for the plaintiff or for the defendants, and upon what issue; and, if for the plaintiff, upon any issue entitling him to judgment, then upon what principles the damages are to be assessed."

Mr. Prentice, in arguing the case, pointed out that if there was any neglect on the part of the board, that neglect was alleged after the rent was due, and not before. But there was no defence to that part, and the real question between the parties rested in the cross action.

The Lord Chief Baron said the court would like to know first what Mr. Hope required the local board to do.

Mr. Murphy said the plaintiff (Mr. Hope) was in a substantial case. The first question was, what were Mr. Hope's rights under the lease? He proposed showing that the board were bound to pay damages for contracting to do what they could not perform; and there would have been no question in the matter but for the addition of the words "and such parts thereof as shall flow by gravitation." The first question was, in what position did the parties stand to

each other at the time the words were inserted? To show that, he would read the advertisement issued by the board at the time they wanted to let the farm:—"*To Scientific Agriculturists.*—The Romford Local Board of Health are desirous to receive tenders from persons wishing to hire 120 acres of light land, or thereabouts, recently purchased for the reception of the sewage of the town of Romford, which town contains a large and increasing brewery and about 6000 inhabitants. The sewage will be pumped on to the farm by the local board, and the lessee will be bound to receive the whole of such sewage, and use the same for the purpose of irrigation. There is a first-rate residence, with suitable buildings and a large garden, enclosed with brick walls." The learned counsel dwelt upon the words that the tenant "will be bound to receive the whole of the sewage of the town of Romford."

His LORDSHIP: We must look to the lease alone. That simply shows that the sewage should be pumped upon the plaintiff's land.

Mr. MURPHY said if his lordship would look at the advertisement he would see that Mr. Hope was bound to receive the whole; and, being thus bound to receive it, surely he was entitled to have it. He then referred to the legal obligations of the board, and quoted 11 & 12 Vict., cap. 63, sec. 45, to show the powers the board possessed, and the obligation resting upon them to drain the whole of the town. If the occupiers failed to make the necessary connexions, the board would do it, and charge the owners for the work; therefore, in entering into negotiations, Mr. Hope knew he was dealing with persons who possessed every legal power to carry out such a contract as they made. He then quoted the 5th section of cap. 113 of the Sewage Utilization Act, dwelling upon the latter sentence, "and care shall be taken that all the sewage which it is the duty of the sewer authority to dispose of shall be disposed of in that manner," &c. He then referred to the position of the local board prior to the drawing up of the lease, and asked their lordships to look at the position of the parties then, and say what was the fair construction to be placed upon the qualifying clause, and whether by that Mr. Hope was bound to deal with the whole of the sewage of the town. But, according to his learned friend's argument, the board had the power of giving him what they pleased, and he must still continue to pay £600 per annum for it.

His LORDSHIP: First put before us what the board were bound to do, and what they have not done.

Mr. MURPHY: I say they were bound to give Mr. Hope the whole of the sewage of the district. They were bound to connect every house, and our case is that there were a number of houses in which no such connexions were made.

His LORDSHIP: Your replication does not show that they had not given notice. It does not even specify that they failed to give notice.

Mr. MURPHY, in reply, read the 11th paragraph in the arbitrator's report, which stated that "the board might, without difficulty, since the lease was executed, have put in force the powers of the Act, and constructed sewers draining by gravitation into the outfall for those houses for which no sewers were available, or connected the houses with the existing sewers where those sewers were available;" whilst, continued the speaker, in other places they were drained into cesspools. At the time the negotiations were made Mr. Hope had no precise information as to that portion of the matter, but he trusted that the board—a legally responsible body—would put their powers in force, and he made no further inquiry at the date of the execution of the lease.

Baron AMPHLETT: But why did he not put a covenant in to that effect?

Mr. MURPHY: Because he was dealing with a public board that understood the meaning of the expression in the lease.

His LORDSHIP: But if the board failed to do their duty he could have got a *mandamus* to compel them.

Mr. MURPHY: I contend that the £600 per year was to be paid for the whole of the sewage of the town of Romford.

His LORDSHIP: First of all, let us deal with the words "as shall flow by gravitation," the board meaning "shall be conveyed upon your land."

Mr. MURPHY: Then what is the meaning of the word "shall?"

His LORDSHIP: All that does flow now or "shall" flow at any other time.

Mr. MURPHY: It does not mean what the other side says.

His LORDSHIP: What does it mean, then?

Mr. MURPHY submitted that the phrase meant to refer to houses that might come into existence after the signing of the lease; that the board intended the term to carry the whole of the sewage of the town; and also intended to protect themselves against the extra expense of pumping, and that Mr. Hope was to receive all that could come into the sewer by the process of gravitation—that was the "plain meaning" of the word. Else why was the word "gravitation" introduced at all? The phrase "that will pass by gravitation" was perfectly understood by engineers, and was distinguished as that class of sewage that could be obtained in an inexpensive manner, and free from the cost of pumping. What other theory could be given? If not so, he could not understand why such a word was necessary on the part of the board.

Baron AMPHLETT: It means all the sewage that will hereafter flow.

Mr. MURPHY: If that construction is to follow, supposing the pipe does not act, and there is a stoppage, on that assumption Mr. Hope will still be bound to pay his £600.

His LORDSHIP: But, in assuming that, you are assuming the construction of a contract that never existed. If they prevented a flow they would derogate from the provisions of the lease.

Baron CLEASBY: It might be, too, that the works would require separation.

Mr. MURPHY: But the lease is based upon the policy that the sewage flung from the population amounted to so much in quantity, not exceeding 20 gallons from every person. That sheds a light upon what they were dealing with. It shows that they meant the whole of the sewage derived from the population of the town. Why were 20 gallons specified for each inhabitant without each inhabitant was to be connected with the sewer? The learned gentleman then passed on to the other points. As to the rent due, his answer was, as Mr. Hope was obstructed from receiving the sewage, he could not be called upon to pay for what he never received. Next as to eviction. The whole of the sewage was devised to him. Supposing he let a man a black acre and a white acre, and he prevented the man from going on to the black acre, he could not demand the whole of the rent. The case was perfectly analogous, and this case was the suspension of a right granted. On that ground he was entitled to receive, if only upon the finding of the arbitrator, all the sewage abstracted in the months of August, September, and October, 1873.

His LORDSHIP: If any portion has been abstracted from the land of Mr. Hope after its arrival there by gravitation, he is entitled to damages.

Mr. PRENTICE: We say that he is, the damages to be assessed by a surveyor.

Mr. MURPHY: That claim is a serious one, independent of other matters.

The LORD CHIEF BARON, in delivering his judgment, said that as regarded the damages referred to by the overflow of the sewage in the months named, there was no principle in the matter; it was simply what would be the value to Mr. Hope. He had great reason to complain of the board, they having the power, in not compelling some 30, 40, or 50 inhabitants to make the connexions between their houses and the sewer. Upon that point they failed to execute the necessary works; Mr. Hope had the power to compel them to do so; but it was quite another question as to whether he was entitled to damages for their not doing it. It was perfectly clear he was not. He hoped, for the future, if the board had failed in that respect, they would not fail to exercise their powers any longer. So much for the action by Mr. Hope against the board. With regard to the rent, it was no answer to the claim of the board to say he was not supplied with all he might have been supplied with. There must be judgment for the Board of Health to recover the rent.

Baron CLEASBY was of the same opinion. He said the general question resolved itself into what was the nature of the covenant. The terms of the demise appeared plain, "all the sewage, or so much as should flow by gravitation." If there was any ambiguity in the terms of the covenant, Mr. Hope was at liberty to alter it. But there appeared to him no ambiguity. It seemed conclusive that the real intention of the board was that he should have whatever passed by gravitation. With regard to the connexion of the houses, that was to be dealt with at the discretion of the board. The contract did not state that the board intended to connect all immediately. They had gone on doing so, and it had been done in many cases. The terms of the contract said, "You must give us all the sewage that passes by gravitation;" but there was no provision in that contract which said, "You shall connect every house."

Baron AMPHLETT said he was of the same opinion. The only point of difficulty he saw was the question raised by Mr. Murphy, that if the board chose to take away the sewage altogether, was Mr. Hope still to go on paying the board £600 a year? His answer was, such a course would be a distinct breach of agreement. If they diverted the sewage altogether, not bringing any of it to the sewer, or if they took any active steps to bring it to any other part of their district, that might very well form the subject of an action. If, on the other hand, the board immediately exercised all their powers against their houses, it would have been extremely improper if they had consented to such a clause in their covenant, interminable litigation would have arisen as to whether some particular house or houses could be compelled to turn their drainage into the sewer; there might then have been a separate issue raised to a hundred different houses. But the board said, "We know what sewage is now brought into the outlet, and we will bargain that you shall enjoy that sewage." No doubt the board would now carry out the different powers entrusted to them by the Act of Parliament, if they had not carried them out; and the only remedy Mr. Hope had was to enforce the carrying out of their public duties alleged in the warrant.

Judgment for the local board.

SHEFFIELD COUNTY COURT.—FRIDAY, NOV. 18.

(*Before* T. ELLISON, *Esq., Judge.*)

ACCIDENT AT THE SHEFFIELD GAS-WORKS.

George Adams, a labourer living in Nursery Street, and employed by the Sheffield United Gaslight Company, sued Mr. *Nuscheler*, engineer, of Doncaster, for £50 for damages occasioned, as he alleged, by the negligence of the defendant's servants.

Mr. E. K. BINNS appeared for the plaintiff, and Mr. HAROLD THOMAS for the defendant.

Mr. BINNS, in opening the case, stated that the plaintiff was employed as a labourer by the gas company, and the defendant was an engineer who had contracted with the company for the erection of the iron roof of a retort-house. The plaintiff was assisting to build the brickwork of that house, and whilst he was in the retort-house on the 8th of July last, filling a hod with some bricks, the roof came down. The witnesses would prove that it was caused by the negligence of some of the defendant's servants in twisting the roof to bring some principals into perpendicular. There were some block-ropes attached to the principals, and when the block-ropes were removed the consequence was that the whole weight of the principals was thrown on to the "guy" ropes, and these ropes, being old ones, broke, and the first principal fell down, bringing down seven or eight others which were attached to it, as well as the whole of the roof. The plaintiff, at that time being under the roof, was severely injured and taken to the infirmary, where he remained three days. He subsequently returned to the gas-works, but he had not since been able to do the same kind of work as he did previous to the accident. He would also have become a stoker in the ordinary course of things if he had been fit, when he would have got far higher wages than he did at present. Before the accident he was in receipt of £1 2s. per week, and though the company had been good enough to pay him that amount since, yet he had not done the same class of work.

The plaintiff and several of the persons who witnessed the accident were called and bore out Mr. Binns's statement.

For the defence, Mr. THOMAS contended that there was no case, on the ground that these workmen were under a common employment. The damage, he submitted, that happened to the plaintiff was the result of his own supineness, because he ran himself into danger, instead of going away when he saw the men trying to pull the principals into perpendicular. He also stated that the plaintiff's employer said that he was equally as good a workman now as he was before the accident, and that was the reason he was receiving the same wages now as he did then, and not from any consideration of his employer.

Mr. *Nuscheler*, the defendant, was called, and stated that the "guy" ropes were very strong ones—in fact, stronger ones than were generally used for the purpose.

A number of witnesses were called for the defence, but the case was not concluded at five o'clock, and was adjourned until the following Thursday.

THURSDAY NOV. 19.

Mr. BINNS this day addressed the court, and maintained that the evidence for the defence did not meet the case at all. The plaintiff, not being the servant of the defendant, was entitled to bring the action. The simple ground of action between the parties was whether the pole, by the removal of which the accident was caused, was removed by the servants of the gas company or the servants of the defendant. The tale told by the defendant was an improbable story, and the burden of the evidence lay with the plaintiff.

His HONOUR said he would give judgment that day fortnight.

MANSION HOUSE POLICE COURT.—THURSDAY, NOV. 19.

(*Before the* EX-LORD MAYOR.)

EUPION GAS SHARES.

Joseph Aspinall, Samuel Gurney Fry, G. P. Knocker, John S. Muir, and *C Knocker* again surrendered to their bail to answer the charge of conspiracy to defraud.

The witnesses examined for the prosecution were Mr. *G. S. Clement*, Mr. *J. C. Fielding*, and Mr. *J. R. R. Godfrey*, stockbrokers, and Mr. *C. W. Spencer*, an accountant, who spoke to large dealings in Eupion shares. The rest of the examination was occupied in the production and reading of certain documents and telegrams connected with the case, one of them being an agreement, dated May 28, by which Muir sold to Charles Knocker for £500 all his interest in the company. Two original telegrams were produced, purporting to have been sent from Fry to Spencer, but one was in the handwriting of Aspinall and the other of Muir.

Mr. MONTAGU WILLIAMS, in the course of the hearing, observed that, as at present advised, the defendants proposed to call about 220 stockbrokers and 37 financiers, including Messrs. Bischoffsheim and Goldschmidt and Baron Albert Grant, to prove that what was done was in the ordinary course of business.

FRIDAY, NOV. 20.

Mr. *John Alers Hankey*, the prosecutor, was examined to-day. He stated that he was a member of the firm of Coates and Hankey, stockbrokers, Gresham Street. In September last he first heard of the Eupion Company, when he was requested by Mr. Richardson to buy some shares in it at certain prices, with a limit, but he was unable to get them. He saw a Mr. Dawson on the subject, and afterwards bought some shares at a later date for Richardson and Dawson.

Captain Rayner (a previous witness) afterwards called on him, and asked him to dispose of some shares in the company. He said it was singular, as he had been asked to buy some a few days before. Rayner said the shares were for a Dr. Muir, and were in the name of Samuel Gurney Fry. He understood 15,000 shares were said to be in his name, and Captain Rayner declined to be responsible for the transaction. He declined to have anything to do with the matter, unless Muir and Fry were brought to his office. From the first he felt doubtful about the delivery. Ultimately he sold to Charles Knocker for Muir 2800 shares which had stood in S. G. Fry's name, and when the market was rising he could not get them delivered, as he learned they had all been transferred. He added that it was on the recommendation of the Committee of the Stock Exchange that he instituted criminal proceedings. His actual loss was £130, but he stood to lose £2400.

The case was again adjourned.

SOUTHWARK POLICE COURT.—Saturday, Nov. 21.

(*Before Mr.* Benson.)

CONVICTION OF A STOKER FOR LEAVING EMPLOYMENT WITHOUT NOTICE.

John Jones, a scoop-driver and stoker in the employ of the Phœnix Gas Company, was summoned under the Masters and Servants Act for leaving his employment without giving the usual week's notice.

Mr. Hale prosecuted on behalf of the company.

George Todey, foreman at the works at Bankside, said that on the 27th of June last he engaged the defendant as scoop-driver at 38s. 9d. weekly, paid every Friday evening. At the time he was told that a week's notice was required on both sides, and printed notices to that effect were posted up in the office and lobbies. On the 13th inst. he received his week's wages, and left his employment without giving notice.

In answer to the Magistrate, *witness* said the defendant well knew that a notice to leave was required. He had complained to witness about a new scoop, which weighed about 70 lbs., and contained 1 cwt. of coal. He had no reason to do so, as it was lighter than the old one, and two men were employed to assist him. He was certainly exposed to great heat during his work, but was paid accordingly.

Mr. *James Francis Braidwood*, assistant-engineer of the gas-works, said that the defendant was quite able to work the scoop, as it was much lighter than the old one. In consequence of his leaving without notice they had been put to considerable inconvenience, but they only put the loss down at 20s.

The *defendant* said that the new scoop was harder to work than the old one, and when he complained of it he was laughed at. The work was too much for him, and he could not do it any longer. He had seen men discharged without receiving notice. He denied having seen the placards.

Mr. Hale stated that as soon as the defendant left the Phœnix works he went to work at another gas-works. No workman was dismissed without notice unless through misconduct.

The *defendant* said that at the other gas-works the work was much more easy; he was not going to kill himself.

The Magistrate convicted the defendant, and ordered him to pay 20s., and 2s. costs.

Miscellaneous News.

METROPOLIS GAS SUPPLY.

Mile End Old Town Vestry.

The Ordinary Meeting of this Vestry was held on Wednesday last—Mr. Churchwarden Wood in the chair.

After the disposal of some routine business,

Mr. Newton, in accordance with notice, proceeded to call the attention of the vestry to the various gas bills it is proposed to introduce into Parliament during the ensuing session—these being the three bills to be promoted by the Corporation of the City and the Metropolitan Board of Works and the bill to be introduced by the Commercial and Ratcliff Gas Companies. He also called attention to the letter of the Board of Trade on metropolitan gas supply, and moved that all these be remitted to a committee of the vestry to examine and report. He said he thought it necessary, at this juncture of affairs, to bring the question of gas supply before the vestry, because there were several measures to be promoted in the ensuing session of Parliament more or less affecting the district. He saw by the printed notices that there were two bills that affected the district directly, one of them very considerably, and the other to only a small extent. The general question of gas supply had engaged the attention of the consumers during the whole of the year. He need not tell them, for they had had frequent communications there, and had no doubt seen, from reports in the newspapers, that considerable agitation had sprung up in various parts of the metropolis, and especially in those parts that were supplied hy the Chartered and Imperial Companies. So long, however, as the question only affected those two companies, it did not directly affect this vestry, because no part of the district represented by the vestry was supplied by either of them. They had, therefore, only the general interest in the question which they must necessarily take in all things that concerned the welfare of London. But, with regard to the districts supplied by those companies, the excitement on the subject was so intense that the Metropolitan Board of Works, under considerable pressure from the vestries and local boards, took up the question with a view to obtaining some general legislation on the subject, and probably this vestry knew that it was the intention of the board to proceed to Parliament for authority to construct new works, and thus give a separate and independent supply of gas to London. It might be said, "Why should this be done, seeing that there is already so much capital invested in gas property? The works are already constructed, and the mains are laid down through almost every street in the metropolis." Well, there was great force in those observations, and nothing could justify the proposal of the Metropolitan Board, unless it were the extravagance of the companies and the extreme hardships inflicted on the consumers by them. Only a few years ago the companies were invested with additional authority from Parliament for obtaining an extension of capital, with a view that they should supply gas of greater purity, higher illuminating power, and at a reduced cost to the consumers, and when, so far from doing this, it was found that the gas supplied was dearer under present management than it had been for many years past, they could not wonder at the degree of excitement that existed, or that the Metropolitan Board should take the step they had taken. In order to show the feeling he had on the question when it came before the board, he would read a short extract from a speech which he delivered, and which was reported in the Journal of Gas Lighting on the 4th of August. He then said that what he proposed would be this:—

The board should go for their bill, but he did not say that if the companies were prepared to agree to proper restrictions that they should proceed with their bill. All that the board wanted was to see that the consumers were properly and efficiently protected. What he therefore would suggest was, that it should be made the interest of the companies to supply gas at a low price, and that their dividend should be regulated by the price which they charged. Take, for the sake of argument, that gas was supplied at 4s. per 1000, a price which in the present state of things was not extravagant. In his (Mr. Newton's) district gas was now being supplied by the Commercial Company at that price, and in a neighbouring district the Ratcliff Company were supplying at 3s. 9d. For many years past that company had not charged more than 4s., and he was prepared to say that if the Great Central Company had continued their supply as an independent company in the City of London, and had not been amalgamated by the Chartered Company, they would have been supplying gas now at 3s. 9d. But taking 4s. as the proper price at the present time, he would say, so long as the company charged that price, they should be entitled to take 10 per cent. If they raised the price to 4s. 3d., let their dividends be reduced one-half per cent., and for every additional 3d. a further similar reduction. The consequences would be that, if they charged 4s. 3d., they would receive 9½ per cent.; if 4s. 6d., 9 per cent.; if 4s. 9d., 8½ per cent.; if 5s., 8 per cent., and so on. He thought that this would be much more effective than relying upon commissioners appointed by the Board of Trade to determine whether due care and management had been exercised in the manufacture of gas.

He had read this for the purpose of showing that his object was to secure in the most effectual manner possible the supply of good, pure, and well-illuminating gas at an economical price to the consumers. He did not want to enter upon a career of gas-making. He did not want to see an additional 10 or 12 millions invested in gas. He was not desirous that the streets should be ripped up again, and a new set of mains be laid throughout the whole metropolis. It would be madness if what they wanted could be effected without. But what he did desire to see was that the system of extravagance which was going on in the largest companies should not be extended, by which the consumers in that district would be made ere long to pay 5s. per 1000 cubic feet of gas, where they could, and ought to be, supplied at 4s. or 3s. 9d. for the same quality. But presuming that the companies would either insist on very extravagant terms of purchase for their plant, or that they would resist all attempts at legislation which any bill might seek to impose upon them, he thought it advisable, and he still thought so, to proceed with a bill for powers to give an independent supply, in order that Parliament might treat the companies as they were treated in 1867, when the select committee, presided over by Mr. Cardwell, told the companies that unless they consented to certain regulations, which the committee considered fair and equitable, they would be disposed to pass a bill for the corporation, authorizing them to give an independent supply, so that that bill was used as a lever to force on the companies those regulations which had been in operation in the City ever since 1868. The companies, as at present constituted, had no check placed on them in regard to any of their expenditure. The Chartered Gas Company were not entitled to charge more than 3s. 9d. per 1000 feet, but they had the privilege every year of going before a commission appointed by the Board of Trade, and if they could show that, after the exercise of due skill and management, they could not earn 10 per cent. on their capital at that price, they were entitled to have it increased to such a sum as was necessary for the purpose. The Chartered Company went before the commission this year, and claimed that they ought to charge 5s. 2d. The question was fought very hard, both by the company, the corporation, and the Metropolitan Board, and the end was that they were allowed to charge 5s. per 1000. For the whole of this year they had been charging at that rate, and they were now doing so. They had more than three millions of capital invested, and had an income from the sale of gas of more than a million a year at the present time. So that this great company, with all its facilities of manufacture, with new works, in which one would think they had combined all the newest improvements for the purpose—notwithstanding all this, their extravagance of management and expenditure was such that they were unable to pay a dividend of 10 per cent. without charging 5s. per 1000 feet for the gas they supplied. To show the feeling of these companies, and what they were entitled to do in regard to the consumers, he would instance a circumstance that took place a few years ago in regard to the Imperial Company. In 1866 that company found themselves in possession of a loan of £260,000, for which they had given debentures, and on which they were paying interest at the rate of 5 per cent. They had the legal power to transfer this debt from the debenture to the share account, and this offered a favourable opportunity of putting money in the shareholders pockets. The directors, therefore, decided to make this so much share capital; and so, ever after, instead of paying interest at 5 per cent., they are paying a dividend of 10 per cent. on it, and thus they saddled the consumers with a payment of £13,000 a year beyond what there was any need to pay, in order that the shareholders might put in their pockets £13,000 a year more. This transfer did not give them a farthing of increased capital to lay down a single main more; but was simply a transfer of the amount from one account to another, with, as he had said, the additional payment of £13,000 a year extra as dividend interest. It was to the interest of the directors of gas companies to spend as much money as they possibly could, and also the shareholders to help them to do so. The more extravagant the directors were, the more capital they required to raise; and it might easily be understood how a shareholder was anxious to purchase gas scrip at par when he could go into the market next day, if he chose, and sell £100 worth of shares for £170, so that the more the directors could throw into the way of the shareholders the better, whilst the poor consumer, who had after all to pay, had not the slightest check on all this extravagance, nor had the company the slightest interest in studying him. What he wanted to see in operation was some degree of mutuality. He wanted to see the shareholder's interest the consumer's interest, so that if the directors extravagantly expended money which they would have to charge on the consumers in order to pay the interest of it to the shareholders, the latter should suffer as well as the consumer. If they put on 1d. per 1000 feet, he would reduce the dividend ¼ per cent.; if they increased the price 4d. per 1000, he would reduce the dividend 1 per cent.; and then, depend upon it, the price of gas would not be raised. There never was such a state of things as had been exhibited during the past few years. Everybody knew that, in consequence of the increase in the price of coal and iron, those who had occasion to use these articles for the purpose of manufacture had suffered greatly, and their profits were reduced to a considerable extent. There was not a railway whose dividends had not been reduced in consequence, not a manufacturer in this metropolis, where coal and iron were largely consumed, where the proprietors had not suffered greatly through the increase in the price of these articles. But the gas companies were the only people who were exempt from the effects of this increase. They had nothing to do but to go before a tribunal established by law, and say, "The people in the country have raised the price of coal, and we must have an increase in our charges in order to pay our 10 per cent. dividend, which we claim to be allowed us by law." These were the reasons why the Metropolitan Board of Works took up the question, and why they would fight it out, not for the purpose of giving an independent supply, or for purchasing up the whole of the companies—though that was likely to come—but for the purpose of obtaining such regulations and such supervision in respect to the sale of gas as would entitle the consumer of gas to the same consideration as those who manufactured it now enjoyed. It was a great power to place in the hands of the directors of these companies, that their interest and that of the shareholders should be distinct and different from the interests of those whom they served. Gas directors exhibited a great deal of human nature in their transactions, and so long as it was to their interest to obtain large advances and large investments of capital, whatever might be the interests of the consumers, depend upon it they would look well after it. He now came to a question that more immediately concerned the vestry. The members were there not only as consumers of gas in a private capacity, but in a public capacity, and as representing the whole interests of the parish and the inhabitants, for whose interests they must do the best they could. They had before them a notice put forth by the two companies which served the district—the Commercial and the Ratcliff—in which an amalgamation was proposed. Taking that notice in conjunction with a letter emanating from the Board of Trade, he must confess he felt a little concern and some apprehension as to what might be the result of legislation upon it. He thought it was the duty of the vestry to look carefully into the question. He did not know what increased capital the two companies were seeking to obtain. It was not necessary, he supposed, to state it in the notices to which he had referred, but it would appear when the bill was pub-

lished. (Having read the letter from the Board of Trade, the speaker continued:) There was a part of this letter which he did not like: he meant that referring to the Chartered Company's mains running through the parish. They had large mains in the Commercial Road; and were preparing to lay another there. This letter pointed to that as a reason why the district should seek to be supplied by that company, and he wanted to raise in the vestry a strong feeling of resistance to any amalgamation to or with the Chartered Company. That company were charging the citizens of London—the most compact supply for the length of main of any district in London—5s. per 1000 cubic feet. He did not know what might be in the minds of the directors of the Commercial Company; the directors of all companies were so reticent and so secret in their proceedings that they might be parties to this scheme for anything he knew to the contrary; but what he did say was that it was the duty of the vestry to object in the most emphatic way to any connexion with the Chartered Gas Company. He had taken the trouble to get out some statistics of the companies that had been absorbed by the Chartered Company. In 1869 the Commercial Gas Company, at the price of 4s., earned a net profit of £53,339, whilst it required only £43,723 to pay the dividend of 10 per cent., leaving £9616 to be carried over to the reserve-fund. In 1870 the excess of earnings over what was necessary for dividend was a sum of nearly £7000. During the following year the directors reduced the price from 4s. to 3s. 9d., and it remained at the latter sum until the middle of 1871, when it was again increased to 4s., in consequence of the high price of coals and other necessaries. In 1869 the Great Central earned a net profit of £33,800, whilst it required only the sum of £20,000 to pay the dividend of 10 per cent. That was the last year of the company's separate existence, the year before amalgamation with the Chartered Company. The dividend of 10 per cent. could have been paid by that company if they had charged 3s. 5d. instead of 4s. per 1000. But for the amalgamation of that company with the Chartered, the citizens of London supplied by the Great Central would have been supplied at 3s. 5d., and would never have gone higher than 3s. 9d., whilst in consequence of amalgamation they had had to pay 5s. during the whole of the present year, which sum they were paying at the present time. How did the Chartered Company stand in relation to the other companies? In 1869, at 4s., they earned net £127,965, which, was £13,484 less than necessary to pay a dividend of 10 per cent., and notwithstanding that that company had swallowed up the surplus earnings of the Great Central and other companies, it had increased its price of gas to 4s. 4d. in 1873, and 5s. in 1874, whilst the Commercial and Ratcliff during that time had remained at 4s. and 3s. 9d. respectively. One other comparison might be made. Suppose that each of the three companies was enabled to manufacture gas at as low a cost as the others, a difference of price to the consumer would still be inevitable. The difference in the amount necessary to pay dividend was considerable, and was of itself sufficient to alarm the consumers of this district. It required, in round numbers, 1s. 6d. per 1000 cubic feet of gas sold to pay the dividend of 10 per cent. to the Chartered shareholders, whilst 1s. 2d. was sufficient in the Commercial Company, and 1s. 1½d. in the Ratcliff. Here was an extra charge of 4d. per 1000 upon Chartered gas, even if they were capable of manufacturing as cheaply as other companies, which they did not seem to be. In 1869, before the amalgamation with the Chartered, 10½d. per 1000 feet of gas sold was sufficient to pay the dividend of 10 per cent. on the Great Central capital; but in consequence of its absorption in that vortex of extravagance called the Chartered Company, it now required 1s. 6d. to pay the dividend. To go no further than this, it was clear that the citizens of London in this item alone were paying 8d. per 1000 more than they would have paid if the Great Central had remained an independent company. The Great Central at the time of its absorption was earning a dividend of over 18 per cent., at 4s. per 1000, and must at once have reduced its price to 3s. 5d. if it had not amalgamated with the Chartered. Now were they going to enact the same thing over again? Were the vestry going to allow themselves to be swallowed up by this company in order that they might be treated as the consumers of the Great Central Company are? He did not think the consumers of this district would, in the present condition of the Chartered Company, listen for a moment to it, but would rise as one man against it. (The speaker proceeded to quote at some length from evidence given by a witness for the Metropolitan Board, before the Revision Commissioners, as to the result of the amalgamations already effected, and then proceeded.) He ventured to express the opinion that this district would never allow such an amalgamation to take place if they could avoid it. In going to Parliament the Commercial and Ratcliff Companies would have to submit to many changes and checks that were not now in operation upon them. What he wanted, and would endeavour to enforce, was that neither the Commercial nor any other company should be allowed to raise any fresh capital unless it was to pay a dividend according to the price charged to the consumer. If they could reduce the price of gas, and at the same time pay the dividend, by all means let them have it. If the company were saddled with such a system as that he had before alluded to, depend upon it the shareholders would look after the directors, and the directors would look after the engineer, and there would be no more increase in the price of gas in this district, except under the most extraordinary and special circumstances. There was no other method of bringing this about. Parliamentary legislation, revision before the Board of Trade, were futile, and only the means of spending so much public money, for all these expenses were paid by the consumers, and not the shareholders. Taking all these facts into consideration, both with regard to supply and cost, he thought it was the duty of the vestry to take note of the question, and to refer it to some committee, who would consider it, bring up a report, and advise as to what was best to be done, at the same time taking action with other districts as might be necessary. He would be much surprised if the whole of the districts at that end of London did not take some interest in this question, which so nearly concerned them. And if there was to be capital raised, let it be on the terms he had said, and let the capital now in use be subject to the same regulations, and there would be more satisfaction in the future than there had been in the past. It was not his intention to reflect in any way upon the company concerned in the supply to this district. He had on many occasions taken the opportunity of comparing their conduct favourably with other companies, and he said this because, if the vestry had not obtained redress, they had had a courteous attention paid to them, and explanation given such as they could give. But even that would not justify the vestry in lying by, and drifting into the hands of the directors, who, for aught they knew, might spring a mine upon them some day, they were so reticent in all their proceedings. Take, for instance, the notice that had appeared. The shareholders did not know anything of it. He (Mr. Newton) read the report of the half yearly meeting of the company, which was held in October, and not a word seemed to have been said about it there. Their actions were so occult; they were under the surface; no one knew of them till they were partially done. The vestry must, therefore, be prepared to act for the consumers, whatever the feeling might be towards the directors of any particular company, remembering in so doing the great and important interests committed to them by those whom they served. He, therefore, moved that the whole question be referred to a special committee for consideration and report.

Mr. KEMP seconded the motion.

After a few words from Messrs. MOODY, PREECE, RYMER, and KNIGHT on the subject,

Mr. JONES, engineer to the Commercial Gas Company, stated that he was not there as a representative of the gas company, but as a vestryman. He then proceeded to deny that his directors had been guilty of the acts charged to the whole body of directors by Mr. Newton, and explained that the proceedings that the Commercial Company were about to take were forced on them, and that, so far as reticence was concerned, he could assure the vestry the works had been in contemplation for the past four years.

The motion was put and carried, and a committee appointed.

ST. GEORGE, HANOVER SQUARE, VESTRY.

A Meeting of the Vestry was held in the Board-Room, Mount Street, Grosvenor Square, on Thursday last—Col. the Hon. C. S. SCOTT in the chair—the special business being the consideration of a motion of which notice had been given by Mr. Leslie, and which had been postponed from a previous meeting.

Before the motion was brought on, the letter addressed by the Board of Trade to the Metropolis Municipal Association on the gas question was read; also a letter from the vestry of St. George-the-Martyr, Southwark, stating that, in the opinion of that vestry it is not desirable, nor to the interest of the ratepayers, that the Metropolitan Board of Works should have power to compete with the gas companies in supplying gas to the public.

Mr. LESLIE said he did not think he had ever had the pleasure of addressing the vestry upon a question of such vast importance as the one he was now to submit to their notice. He first called their attention in May, 1870, to the controversy in respect of the gas supply, and he was now prepared to prove that every statement made in his circular on that occasion was correct both as to law and fact. The law, as stated in that circular, had been upheld by the unanimous decision of the Court of Queen's Bench, and on appeal by the Court of Exchequer Chamber.

Mr. COVE wished to ask a question on this point. If Mr. Leslie was right in the matter referred to, how was it that in the action between The Gaslight and Coke Company and the vestry the latter was cast in costs?

Mr. LESLIE said he would explain how it was. The parish had consumed the gas charged for, and however much they might complain of the gas supplied, there was no remedy as to paying the amount of the bill. The Court of Queen's Bench referred the question to Mr. Manisty, in chambers, and he decided against the parish, and they had to pay the bill—for what? For lighting the parish. There was no defence to that. But the law was determined by the court, and affirmed by the Exchequer Chamber.

Mr. EVANS: The matter was referred to arbitration after it was before a jury.

Mr. LESLIE: Oh, no; it was settled. There was no decision of the jury. It was taken out of the hands of the jury by the order of the judge.

Mr. EVANS: How came it into the Queen's Bench?

Mr. LESLIE: By our defending the action.

Mr. EVANS: Then it did come before a jury.

Mr. LESLIE: And before the jury came to a decision, the judge said it was too important a matter to be settled in that way, and that it ought to go before the full court on a special case. The full court decided in favour of the parish. The judgment was appealed against, and the Exchequer Chamber decided in favour of the parish. But when the case went back to the arbitrator, you had no defence; you could not say the parish had not been lighted, and you were bound to pay for the gas, but the company had a portion of the costs to pay.

Mr. EVANS said he had no doubt it was his want of intelligence, but he could not see how the assertion of Mr. Leslie was borne out.

A MEMBER rose to order, and objected to this system of questioning proceeding.

Mr. LESLIE resumed: He said the next point was this—when he brought the gas question first before the vestry, the sulphur impurities in the gas supplied by The Gaslight and Coke Company amounted to 29·31 grains per 100 cubic feet, and the ammonia impurity to 5 grains. At the present time the reports of Dr. Letheby to the Board of Trade, of Mr. C. Heisch to the corporation, and of Mr. Keates to the Metropolitan Board, agreed in showing that the sulphur impurities had been reduced to 8·68 grains, and the ammonia impurities to only 0·02 grain per 100 cubic feet. He need hardly remind the vestry that, to persons affected with bronchial attacks, the consequence of having so large an amount of sulphur in the gas as formerly present was very injurious, but on that point he would not proceed further. The authorities already quoted proved that the present average illuminating power of the company's gas was 17·05 candles per 5 cubic feet consumed per hour. Upon the authority of these reports it was evident that this gas was the best made in London—in fact, there had never been anything equal to it. He was, therefore, now going to show that it was to the interest of the vestry to give their support to the company, inasmuch as they proposed, from the beginning of 1875, to reduce the price of their gas 25 per cent., with a prospect of a further reduction from the discontinuance of their Westminster and Blackfriars works, because the amount realized by the sale of the land occupied by those stations must go in reduction of the capital upon which maximum dividends were now paid. The company had already discontinued and sold two of their urban stations—the Brick Lane and Curtain Road works—and the proceeds of those sales had been brought into capital account. In the parish of St. George there were about 7000 consumers supplied by this company, and, taking these at six to a family, there was more than half the population which would be benefited by the reductions to which he now pointed. In the street in which he himself resided there were 61 ratepayers, and there were 109 gas accounts. His next door neighbours, Messrs. Lewis and Allenby, would benefit by the reductions £163 per annum, and the total saving to the whole of the consumers in the parish would be for the year equivalent to a 7d. rate. As incidental to this local question, but still a very important consideration to the general public, he might mention that the proposed reduction by The Gaslight and Coke Company would save the ratepayers in the City of London during the year 1875 nearly £100,000. There were 22,000 ratepayers in the City, and each one being a gas consumer would benefit to the extent of his consumption in this reduction. A further benefit, also, they would receive in the disposal of the Blackfriars station, the supply being now given entirely from Beckton. His original quarrel with reference to the Beckton works was on account of the large capital expended in the purchase of land, &c., there; but when the company were thus enabled to dispose of four manufacturing stations in London, it materially altered the state of affairs. The sale of the stations at Blackfriars and Westminster would produce a very large sum of money, the benefit of which must go to the consumers by *pro tanto* reducing the capital upon which dividend had to be paid. Much was said about the company paying 10 per cent., but any one who would take the trouble to examine the accounts laid before Parliament would find that they did not pay anything like 10 per cent. upon the average. The question which he wished the vestry to express an opinion upon was this—whether they would consent to accept the offer made by the company of a present reduction of 25 per cent. and a probable reduction to a greater amount, or whether they would give their assent to the establishment by the Metropolitan Board of an independent supply of gas in competition with the company. What did this "independent supply" involve? First of all, a probable outlay of upwards of £10,000,000 for the whole metropolis; next the breaking up of more than 1500 miles of roadways and footways to put down new mains and services, to the utter destruction of the whole of the traffic and trade of London and Westminster for an indefinite period—to secure what? A problematical cheaper and better supply of gas. And here let them ask themselves what would be the effect on the iron market if a demand arose for the supply of mains and services for 117 square miles of the metropolis. The present price, high as it was, was ridiculously low to what it would be then. The moment it was known that such a quantity of iron was wanted, the price would go up fourfold.

A MEMBER said the board could use the old pipes.

Mr. LESLIE reminded him that they did not belong to the board. This

question of "an independent supply" was the question involved in the first of the three bills now to be promoted by the board, and it had been referred to a sub-committee, which by the way consisted of six members, all of them connected with the City of London. This sub-committee not feeling the ground secure under them, took the opinion of Mr. Cripps, Q.C., the counsel of the board, as to whether it was likely that Parliament would grant the board power to erect and carry on works, the capital required for the purpose being based upon the poor-rate, any loss or damage, or any mischance of profit falling upon the ratepayers. And this was Mr. Cripps's opinion: "It is known that Parliament has never yet allowed a competing supply of gas of which the rates were the origin of the capital, and the source from whence all loss and failure is to be made good." The vestry had also heard read the letter from the Board of Trade upon this point, a letter which, though brought before the Metropolitan Board, they refused to read, and contented themselves by referring it to a committee. The questions of the amalgamation of the companies or the purchase of their undertakings were of vast importance to the ratepayers. He had taken the trouble to calculate what, at a very low rate of interest, it would cost the metropolis during the next 15 years, if the Metropolitan Board were to purchase the undertakings of the gas companies. The capitals of those companies might be taken at £10,000,000, and the rate of purchase in such matters hitherto adopted was from 20 to 25 years purchase of the profits earned by the companies on their capital. At a very moderate computation this would amount to a sum of £15,000,000. The Metropolitan Loans Act proceeded in this direction:—it took 1-55th part of the capital yearly to redeem the debt, to which would have to be added interest, and the whole would come into the precept of the board, affecting every ratepayer in the metropolis. During the first year they would have to pay £525,000 for interest, and £272,727, being 1-55th part of the capital raised, making together £797,727. He would not trouble the vestry with each subsequent year's repayment, but take the quinquennial periods. In the first five years the ratepayers of the metropolis would have to pay £3,893,205; in the second five years, £3,654,630; and, in the last five years, £3,416,053; making together £10,963,888; and would then leave a debt of something like 10 millions for future ratepayers to redeem! And all this to obtain a problematically better and cheaper supply of gas. He had had before him the accounts of the Corporation of Bolton for the past year. The corporation bought up the gas company, and had been supplying gas at 5s. per 1000 cubic feet, with a profit during the whole of that period of £270! So much for the results of purchasing a gas undertaking. The Works and General Purposes Committee of the Metropolitan Board had, however, come to the conclusion that they could not recommend the board to adopt such a step. Then, as the letter from the Board of Trade effectually disposed of the question of a competing supply, the Board of Works must fall back upon their third bill, the meaning of which he confessed he did not understand, and he believed no one else did. In conclusion, he said that the motion he intended to submit he had asked no one to second. He felt it right to leave the matter in the hands of the members, as trustees of the ratepayers, to decide whether they would accept the boon offered by the gas company, or whether they would give their assent to the promotion by the Metropolitan Board of a scheme which would bring them into active opposition to all the companies. He moved—"That the present and future prospects of reduction in the price of gas, as above set forth, induce this vestry, as representatives and trustees of so many thousands of their constituents thereby affected, to acquiesce in the proposals by The Gaslight and Coke Company, while at the same time it preserves the roadways and footways of the whole parish free for the comfort, traffic, trade, and commerce of the ratepayers from the ruinous effects of new gas-mains and house services."

Mr. DOWDESWELL said he would second this motion as he seconded a motion by Mr. Leslie when the matter was first brought before the vestry, because he was desirous, if possible, to get a better supply of gas. He was bound, however, to say that he had not seen any improvement in the past, and the question arose in his mind whether, if the gas company did give them the boon now promised, it would be continued. It was very desirable, if possible, to prevent the necessity for breaking up the streets in order to lay new mains, and he could only hope that what Mr. Leslie had predicted as to the conduct of the company would be realized.

Mr. JAMES said he should move an amendment to the following effect—"That this vestry approve of the action taken by the Metropolitan Board of Works in their endeavours to obtain a better and cheaper supply of gas to the metropolis." Mr. Leslie had taken a great interest in the gas question, and had brought it before the vestry year by year for the last four years; but what had been the result so far as the pockets of the ratepayers were concerned. If the minute-book of the vestry were referred to, it would be found that they had paid some hundreds of pounds in costs in connexion with the gas agitation, and he was prepared to affirm that they had never realized one iota of benefit. On the contrary, as he stated some time ago, so long as the law of 1868 existed, it was no use offering resistance to the company; their fetters were rivetted upon them, and opposition only made matters worse. He did not mean to say that the company were sinners above all sinners, and he was not forgetful that they had the interest of their shareholders to look to; but what he complained of was that the law gave them the power to act in the way they had done. And although they now offered to reduce the price of gas, there was no guarantee that the reduction would continue. Nor did he give the company credit for desiring to confer a boon upon the public by the course they had taken. The increased rates which they had obtained from the Revision Commissioners had raised such an outcry among the consumers that they had brought pressure to bear upon the Metropolitan Board to help them to a remedy. It was the determination of the board to apply to Parliament for a remedy, and not because of any change in the tactics of the company, that the promised reduction of price had been secured. Mr. Leslie had raised up the bugbear of a total stoppage of the traffic of London by the proposed action of the Metropolitan Board, and an expenditure out of the rates of ten or fifteen millions. But did any one suppose that the Metropolitan Board were such simpletons as to think seriously of any scheme of the kind? They never intended it, and though they proposed three alternative schemes, all that they desired or hoped to accomplish was a system of uniform regulation for all the companies.

Mr. FINCH seconded the amendment because he sincerely thought the Metropolitan Board were doing the right thing. Mr. Leslie advised the vestry to "rest and be thankful;" but what had they to be thankful for? It was true that "a sop in the pan" was now offered them by the gas company, but this had only been extorted by pressure, and after the ratepayers had expended their money and time in supporting an agitation against them. Mr. Leslie told them it was all nonsense to think of the Metropolitan Board buying up the gas companies, and, so far, he agreed with Mr. Leslie. He believed such a step would never be taken in the lifetime of the present generation; but there was nothing to prevent them from seeking to acquire more control over the companies. There was no disposition to deprive the companies of a respectable dividend on their capital, but it was desirable that the consumers should be assured that such capital was judiciously laid out. Mr. Leslie had from time to time brought charges against the gas company of extravagance in the purchase of land at Beckton, and had more than hinted at something underhanded in their dealings with the Ironmongers Company. It was to prevent such things in the future, and to control the affairs of the companies, that action should now be taken, and therefore it was incumbent on the vestry to support the Metropolitan Board. Every one knew that that body would never attempt to create new gas-works, or that if they did attempt it no Government would allow it. It was also as well known that the purchase of the gas companies was an utter impossibility. But the third plan promoted by the Metropolitan Board, and approved in the circular of the Board of Trade, was the policy which ought to be supported.

Mr. FLEMING said he had been one of Mr. Leslie's most ardent supporters on the gas question from the first, but on the present occasion he could not coincide with him. He did not agree with Mr. James when he said that the last four years agitation had been fruitless, because he did not believe they would have had the now promised reduction of price but for the pressure they had put upon the company. But he thought they should not yet rest and be thankful.

Mr. WALKER said he represented 3500 ratepayers in the parish, who consumed gas supplied by the London Company, and he knew they had nothing to be thankful for, inasmuch as there had been no improvement in the quality or illuminating power of the gas, though they were paying 9d. per 1000 more for it than formerly. He believed that the Grosvenor Place district of that company was one of the worst supplied in the metropolis, and he knew of several small towns and villages in Berkshire which were so much better lighted that it was like comparing the bright sunlight of noonday to a farthing candle. He happened to live in a street where formerly there were the mains of three companies, so that the consumers, if they did not approve of one, could go to another. But now they were deprived of that privilege, and the company which had the monopoly were so peremptory that, on one occasion, the collector having called for the gas bill during his absence from home, he received notice that, unless payment was made in four days, his supply would be discontinued. If there had been anything like competition he would never have been thus insulted.

General CODRINGTON hoped the vestry would support the action of the Metropolitan Board in their endeavour to bring all the companies into a fair state of discipline. He had no objection to the companies receiving a reasonable profit on their capital, but he objected to their riding rough-shod over all the parishes they supplied. No doubt there would be great difficulties in the way of introducing a new and independent supply, but he thought there ought to be a power in the hands of the Metropolitan Board, or the vestries, or even private individuals, to make gas, so as, to a certain extent, to compete with the companies. He did not say that such a proceeding would be altogether possible, but such a power ought to be possessed, so as to keep the companies a little in order. As to the promised reduction of price, there was no pledge of its continuance. They only heard of it in a statement from the directors to their shareholders, and even that was accompanied by the intimation that if hereafter it should be necessary, the company would not hesitate to apply again to the commissioners for a revision.

Mr. ARBUTHNOT wished to know whether it was probable the other companies would be likely to offer the same "boon" as Mr. Leslie told them the Chartered Company had offered. If there was any such probability, he should be disposed to support the motion; but, if not, he should support the amendment, feeling sure that the Metropolitan Board would never seriously think of entering on so foolish and absurd a speculation as attempting to set up a competition with the companies. He hoped the course the board would resolve upon would be to enter into friendly and conciliatory relations with the companies, as the best means for securing the end they all had in view. Much was said about the dividends of the companies, but, for his part, he did not think 10 per cent. at all unreasonable, seeing that the shareholders had embarked their capital in a very speculative and doubtful enterprise. No doubt the authorities, in the early days of gas lighting, would have made better terms for the public if they could. Seeing that the companies were willing to enter into what was then a new and untried thing, they were entitled to a high rate of profit, if they could make it. If the enterprise had been a failure they would have lost all their money. And as to the remarks made upon some of the companies applying for a revision of price, they were entitled under the Act of Parliament to make it, and if they could satisfy the commissioners that they were unable, in consequence of the price of coal, to supply gas at the profit allowed them, they were entitled to a suitable advance. Of course if the circumstances again necessitated it, the companies would make a fresh application. He hoped it would not be necessary; but it must not be said that the companies were unreasonable if it should. Probably Mr. Leslie would be satisfied with the discussion which had taken place on the subject, and would withdraw his motion, so that an unanimous resolution of confidence in the Board of Works, that they would not do anything unreasonable, might be adopted.

Mr. COVE joined in appealing to Mr Leslie to withdraw his motion. The ground had been cut away from Mr. Leslie's feet entirely. He assured the vestry that the gas was now much better than formerly; but such was clearly not the case. It was true it passed the tests of the examiners; but practical experience showed that it was very inferior, and that the consumers required more burners than before to give the same amount of light. As to the price, he did not feel satisfied with 3s. 9d.; he wanted gas for less; and he knew that it had been proved by the Gas Committee of the Corporation that it could be sold with a fair profit at 2s. 6d. per 1000. Smaller companies, such as the South Metropolitan, could give their consumers superior gas at 3s.; why, then, should the ratepayers of St. George "rest and be thankful" with gas at 3s. 9d.?

Mr. EVANS said he had a statement in his hand proving that, with a ton of coal, which cost 9s., the company could make 9500 feet of gas. Seeing they were now charging 5s. per 1000, it was easy to calculate what enormous profits they realized.

Mr. LESLIE replied, and remarked that all the speakers who had referred to the inferior quality of the gas were supplied by the London Company, to which his motion had no reference. It was all very well to say, "Support the Metropolitan Board," but support them in what? The board had no idea themselves what they were going to do, and it was impossible any vestryman present could know, and yet they were asked by the amendment to endorse a policy, as yet undetermined, which might involve the ratepayers in the expenditure of millions! He was confident, however, that all the schemes at present before the board would be rejected by Parliament, and that the only results would be the wasteful expenditure of an enormous sum of money on parliamentary agents, counsel, and engineers, and the postponement for an indefinite period of any further reduction in the price of gas. He had given the board notice that he should contest before the Government auditor the whole of the expenses they were now incurring.

On a show of hands, the amendment was carried by 40 votes to 2, and a copy was directed to be sent to the Metropolitan Board.

METROPOLITAN BOARD OF WORKS.

At the Meeting of the Board on Friday last, a letter was reported from the vestry of St. George, Hanover Square, containing a resolution passed by them to the effect that they approved of the action taken by the board in their endeavour to obtain a better and cheaper supply of gas for the metropolis. General Codrington moved that the communication be entered on the minutes. Mr. Leslie opposed the motion, and read a formal protest against the communication being even received. He said the resolution was brought forward without notice, and merely as an amendment to a motion which he submitted to the vestry. His motion referred solely to a local matter—viz., the relation of his own parish to The Gaslight and Coke Company, and yet an amendment affecting the general question of the supply of gas to the metropolis was substituted for it. He desired that his protest should be received and entered on the minutes. The chairman said there was no precedent for such a course. The communication from the vestry was received.

Court of Common Council.

At the Meeting of the City Corporation on Thursday last, the letter from the Board of Trade to the Metropolitan Municipal Association, relative to the supply of gas, was read. Mr. Shaw moved that the letter be referred to the Gas and Water Committee, and observed that it was one that must be satisfactory to members, seeing that it was an endorsement of the views of the committee, as recently expounded to the court. Mr. Bontems suggested that, as a rider to the motion, there should be a provision that the letter be entered on the journals and printed in the minutes, as there were statements in it to which it might be desirable in the future to pin the Board of Trade. Mr. Hammack thought the letter might be reported upon, but Mr. Shaw pointed out that there was no necessity for this. The motion, with the addition suggested by Mr. Bontems, was put and carried.

Dr. Whitmore's report on the illuminating power, pressure, and quality of the coal gas consumed in Marylebone in the month of October:—

October, 1874.	Illuminating Power in Sperm Candles.			Mean Pressure in Tenths of an Inch.		Mean Quanty. of Sulphur in 100 Cu. Ft.	Mean Quanty. of Ammon.in 100 Cu. Ft.	Sulphuretted Hydrogn.
	*Mean of 24 Obser.	Highest.	Lowest.	Highest.	Lowest.	Grains.	Grains.	
Imperial Comp.'s gas	16·13	16·41	15·20	22·32	8·36	16·67	0·83	No trace
Chartered Company's common gas	16·32	16·80	15·64	28·50	13·06	12·98	0·83	No trace
Chartered Company's cannel gas	20·73	21·41	20·00	19·96	12·40	22·43	0·96	No trace

Mean of daily readings of barometer . . . 29·76
" " " thermometer . . . 62·21

* Each observation consists of ten readings of the photometer, at intervals of one minute.

The mean illuminating power of the Imperial Company's gas during October was equal to the light of rather more than 16 sperm candles; it ranged between 15·20 and 16·41 candles, showing throughout the month considerable uniformity. The mean quantity of sulphur found in 100 cubic feet was about 16½ grains, and of ammonia less than one grain. The mean light of the Chartered common gas was equal to about 16½ sperm candles; it ranged between 15·64 and 16·80 candles. On one occasion only was it below the standard of 16 candles. The mean quantity of sulphur amounted to about 13 grains, and of ammonia to less than a grain. The mean light of the cannel gas was equal to 20¾ sperm candles; it ranged between 20 and 21·41 candles. The mean quantity of sulphur in this gas was considerably more than in the other two gases; it amounted to 22·43 grains, and the ammonia to a trifle less than one grain. The pressure of all the gases was fair, and on no occasion, was sulphuretted hydrogen detected in either of them by the ordinary tests. The above results were obtained from the gas manufactured by the Imperial Company at their Fulham works, and from the Chartered Company's gas manufactured at their works, Beckton and Bow.

THE LONDON GAS QUESTION.

[From the *Saturday Review*.]

The letter which Mr. Farrer has written, in Sir C. Adderley's name, to the indefatigable Mr. Beal will discourage the promoters of the corporation and Metropolitan Board Gas Bills. Mr. Beal himself had suggested, in his interview with the President of the Board of Trade, that it was not advisable to revive competition, to break up the streets for the introduction of double sets of mains and of distributing apparatus, and, as he might have added, to throw away hundreds of thousands of pounds in pursuit of an object which is already attained. It was not to be expected that Mr. Beal and his friends would remonstrate against a violation of the principles hitherto adopted by Parliament, and a wanton destruction of the property of the shareholders. When he remarked that the corporations would undersell the companies, or *vice versâ*, he involuntarily extenuated the injustice of the proposed measure. Private traders are entirely incapable of competing with public bodies, which can make good their trade losses by means of taxation. Sir C. Adderley is equally silent with Mr. Beal on the protection which is due to property acquired in reliance on the faith of Parliament. He may ascertain, if he inquires into the question, that parliamentary committees have uniformly refused to sanction the competition of corporate bodies with existing companies for the supply of gas and water; but, perhaps, in his answer to the deputation, he may have intentionally confined himself to the task of stating the objections to Mr. Beal's proposals. As Sir C. Adderley justly remarks, the history of past legislation is not favourable to any attempt on the part of Government to enforce amalgamation as a step to further measures. In substance the Board of Trade seems to agree with Mr. Beal in the questionable proposition that large savings in the cost of supply and administration might be effected by the reduction in the number of companies; but Sir C. Adderley and his advisers deserve credit for a desire to promote economy by enlisting the interest of the companies in the promotion of improvements.

It is not improbable that, in the presence of a more formidable agitation, the City of London and even the Metropolitan Board of Works may reconsider their intention of attacking the gas companies. The owners of private and corporate property too often connive at isolated attacks on the rights of their neighbours; but when they are simultaneously assailed, they may be expected to feel a certain regard for vested interests. When the deputation for abolishing the privileges of the City of Lonnon waited upon Mr. Cross, Mr. Henry Cole urged as one of the reasons for constituting a metropolitan municipality the advantage of obtaining gas at cost price. If an advocate of the corporation had objected that one element of cost ought to be the purchase at a fair value of the property of the companies, Mr. Cole might have replied that the City itself had given notice of a bill for the establishment of a subsidized competition. The susceptibilities of the corporation may perhaps be quickened by the knowledge that it has a common enemy with its own proposed victims in the person of Mr. Beal. The professed hope that the corporation would be, by Mr. Beal's blandishments, tempted to commit suicide, was probably from the first but a diplomatic fiction. If any illusion prevailed on the subject, Lord Mayors, aldermen, and liverymen have lost no time in disabusing the minds of their opponents. When Lord Elcho brings forward his bill for transferring the corporate property to strangers, the City of London will do well, instead of discussing the comparative utility of the present system and the proposed substitute, to take its stand on the simple ground of unquestioned possession, and to deny the expediency or justice in any circumstances of compulsory expropriation. Mr. Beal and Mr. Cole may not inconsistently demand, on behalf of their future municipality, the exclusive control of the gas and water supply of London. The corporation will greatly weaken its own position if it is at the same time defending itself and attacking joint-stock companies.

If the gas consumers or their representatives satisfy themselves that unnecessary expenses are at present incurred by the companies, they may reasonably insist on the purchase of the property. The consumers are the beneficial owners of surplus profits after the payment of limited dividends; and Sir C. Adderley is justified in his belief that the companies, having attained their maximum receipts, have no strong interest in the further improvement of the property. The simplest mode of escaping from the consequences of former legislation would be to tansfer the supply of gas on equitable terms to some public body. In the answer of the President of the Board of Trade to the deputation a more complicated plan is recommended. "It deserves serious consideration whether, the terms of the ultimate purchase being first determined, the companies should not be allowed on complete amalgamation to increase their dividend beyond the present fixed limit in some fixed proportion to any reduction they may thus effect in the price of gas." If all Sir C. Adderley's assumptions proved to be correct, much might be said in favour of the principle which he adopts; but it is doubtful whether any considerable expense would be saved by amalgamation, inasmuch as the productive resources of the larger companies are required for their present use. Within a few years the companies and their customers have suffered extreme inconvenience from delays interposed by the Legislature in the way of their providing additional premises and works. Vast sums have been since expended on the purchase of land and the construction of works, and the Board of Trade greatly exaggerates the alleged waste under the present system. It may, perhaps, be true that a smaller number of places of manufacture would be sufficient if the works were now all to be constructed for the first time, but if the companies were amalgamated they would find it cheaper to maintain the present sources of supply than to abandon them for larger works. The Board of Trade cannot be supposed to have investigated the complicated reasons which have determined the choice of sites for the manufacture of gas. The necessity of avoiding as far as possible populous neighbourhoods accounts for some of the apparent anomalies which may be discerned on the face of the map. In other respects no considerable saving would result from a diminution in the actual number of companies. The cost of the boards themselves is insignificant, and it would seldom be practicable after amalgamation materially to reduce the staff. If the present dividends were increased, even after a diminution of price, the agitation to which the companies have been long exposed would probably become more violent. It is difficult to understand how the terms of purchase could be settled beforehand if the dividends which might be earned were uncertain.

It is, as Sir Charles Adderley says, improbable that any large increase in the value of the property, and therefore in the consideration to be hereafter paid for it, will be sanctioned by Parliament; and yet the possible purchaser would be in no way injured by any increase in the purchase-money, provided it only represented the additional value of the property. It is evident that a dividend of 12 or 9 per cent., in the place of 10 or 7 per cent., would increase the value of the property of the gas companies; and they would be grievously injured if they were compelled to sell their undertaking at a sacrifice of income. It might, indeed, be possible to enact prospectively that a specified public body should be empowered to purchase the property at any time on the basis of the dividend which might have been earned during a certain period; but, as the option would probably be exercised as soon as the dividend exceeded the present limit, the companies would have no object in saving expense or in acquiring additional custom. If a change is required, or if it is conducive to the public interest, there can be no sufficient reason for delaying it. It is, indeed, doubtful whether the consumers would derive any advantage from a transfer of the power of supply; but, at present, they are assured by agitators that they have reason to complain; and, on the other hand, the shareholders are disquieted by periodical attacks on their property. It would, on the whole, be desirable to complete the legislation of former years, by securing to the proprietors their legal dividends and relieving them from the duty of managing the gas supply. The corporation and the Metropolitan Board of Works would lose nothing by a purchase, and it is barely possible that the consumers might ultimately gain.

METROPOLIS WATER SUPPLY.

Dr. Whitmore's report on the composition of the Thames companies and other waters as supplied in Marylebone during the month of October:—

October, 1874.	Total Solid Matter in degrees or grains per Imperial gallon.		* Loss by incineration of Solid Matter in previous column.		Hardness before boiling in degrees.	Hardness after boiling in degrees.
	Oct., 1873. 0°	Oct., 1874. 0°	Oct., 1873. 0°	Oct., 1874. 0°	0°	0°
Distilled Water . . .						
West Middlesex water .	18·52	19·04	0·84	0·88	12·81	2·89
Grand Junction water. .	19·00	19·80	0·92	0·92	13·24	3·04

* The loss by incineration represents the amount of organic and other volatile matters contained in an Imperial gallon (70,000 grains) of water.

During the month the water supplied to the parish by both companies was uniformly bright, clear, and well filtered; the improved quality of the water which characterizes the supply during the dry summer months was generally maintained throughout the whole of October.

Gas Explosion at Keighley.—On Saturday, Nov. 14, a serious gas explosion took place at Cliff Hall, Keighley, the residence of Mr. Butterfield, whereby three persons were injured—one dangerously—and considerable damage to property was caused. It appears that in the afternoon a servant girl went into a room near the conservatory with a lighted candle, and almost immediately an explosion was heard. The girl was knocked down, and on being rescued it was found that she was severely burned about the chest and arms. Mr. Butterfield was slightly injured, as was also another servant. The roof of the conservatory was blown off, and other damage caused, while some of the windows of the house were blown out. The cause of the accident is supposed to have been an escape of gas from the pendant of the gaselier. Plumbers had been in the room repairing the pipes a few days previously, and it is thought that they had inadequately filled the pendant with water.

Gas Explosion at Handsworth.—On Saturday, Nov. 14, an explosion of gas, attended with considerable damage to property, occurred at No. 1, Villa Road Terrace, Villa Road. Mr. Winter, who is a tenant of the house, had observed an escape of gas, and in the afternoon had employed some gas-fitters, not belonging to the gas company, to attend to it. In the evening Mr. Winter again observed the smell of escaped gas, and not feeling satisfied that the workmen had properly done their work, went into the front sitting-room to make an investigation. The burners of the gaselier were lighted, but it would appear that gas had been escaping from the upper part, and had accumulated to a large extent beneath the ceiling. Mr. Winter was passing a light along the pipe of the gaselier to find where the escape was, when immediately there was a terrific explosion. The window of the room and the greater part of the wall were blown into the street, and the front wall of the upper storey, being deprived of its support, also came down with a rush. From this apartment the force of the explosion seems mainly to have gone along the passage, which runs along one side of the house and terminates in a lean-to kitchen. Two walls of the kitchen, with its door and windows, were completely blown away; but, strange to say, Mrs. Winter, who was engaged there, was unhurt, and as soon as she realized what had happened, went into the back garden. The back windows of the house were all broken, and the sashes of a French window to the back sitting-room were torn away from their fastenings and torn open. The end wall of the house was forced several inches out of the perpendicular, the wall between the front sitting-room and the passage was bent over almost as if it had been made of paper, a skylight to the attic was blown off, and altogether the house was so shattered that it will have to be rebuilt. Immediately on the explosion taking place, Mr. Winter appears to have jumped out of the window of the sitting-room on to a heap of *débris* made by the fall of the wall, where he was picked up by a gentleman passing by. Mr. Winter was burnt on the face and hands, and was taken to the General Hospital to have the burns dressed.

WARWICK WATER SUPPLY.

THE HASELEY SCHEME.

On Thursday, Nov. 12, Mr. J. THORNHILL HARRISON, C.E., inspector from the office of the Local Government Board, held an inquiry at the Court House, Warwick, into the merits of the proposed supply of water by gravitation from Haseley. The inquiry had been directed by the Local Government Board before giving their sanction to an application made by the Town Council, acting as the Warwick Urban Sanitary Authority, to borrow £17,500 from the Public Works Loan Commissioners to carry out the scheme.

The INSPECTOR briefly stated the object of the inquiry, and invited any gentleman who was competent to do so to give evidence.

Mr. SANDERSON, solicitor, said that he appeared on behalf of certain ratepayers and freeholders who had subscribed to the memorial which produced the inquiry.

The INSPECTOR dissented from the statement that the inquiry was the result of any memorial. It had been ordered in consequence of the application of the Warwick Town Council for sanction to borrow money to carry out the scheme. It was not, however, necessary to go into that matter. The main task before him was to receive evidence *pro* and *con* on the feasibility or otherwise of the scheme.

The TOWN-CLERK (Mr. Greenway) was then called upon to explain the action of the Town Council. He accordingly related how the report of Dr. Buchanan, in 1870, led the council to take steps to obtain a better water supply. After giving the subject their mature consideration, and calling in the aid of Messrs. Cawley and Newton, consulting engineers, of Manchester, they resolved, in 1871, to obtain an Act of Parliament to carry out the Haseley scheme. Nothing had been done, however, under the powers of that Act, in the purchase of land or acceptance of contracts, it being deemed inexpedient to advance so far before the money was obtained. The limit of time allowed by the Act, which was obtained in 1872 without opposition, was next July. The council were in treaty for the land, and the probability was that they would have to resort to arbitration. A negotiation had also been opened with the directors of the Warwick and Napton Canal, for the passage of the supply main over one of their bridges. As to the present indebtedness of the corporation, they had, under the power of the Sanitary Acts, borrowed £38,000 at six different periods. Of this sum, £11,578 had been repaid, and £26,421 12s. 11d. was still due. With the exception of the two most recently borrowed loans, of small amounts, the interest and principal on all the money had been regularly repaid. It was intended to make application to the Public Works Loan Commissioners for money at 3½ per cent. to repay these in a lump sum. The effect of such a consolidation would be, notwithstanding the interest on the additional sum now proposed to be borrowed, to reduce the annual repayments from £2312 to £1902. The population of the borough in 1851 was 10,570; 1861, 10,973; 1871, 11,001. The present annual expenses of pumping were about £600; but a considerable sum would shortly have to be expended in new machinery, and there was an almost constant expense for repairs.

Mr. *E. Pritchard*, the engineer, was the next witness. He furnished an elaborate and complete history of the scheme from an engineering point of view, illustrating what he said by the aid of more than a score of large plans, affixed round one side of the hall. The area of the watershed of the Haseley Brook proposed to be impounded was 1500 acres. The brook, which took its rise at Honiley Boot (a place two or two and a half miles from the site of the proposed reservoirs), was exceedingly small in volume until it was joined by another stream from the Wroxhall estate at Haseley Green. On either side of the roadway near Haseley mill it was proposed to construct a reservoir; the one on the left-hand side being a settling reservoir, 10 feet deep, to contain 2,116,000 gallons; and that on the right a storeage reservoir, of a depth of 16 feet, of the capacity of 19,519,487 gallons. Three filter-beds, one of which would always be at rest, would purify the water before it passed into the brick conduit which communicated with the 12 and 10 inch supply main; and there were also arrangements for cleansing both reservoirs and filters, besides provision for the conveyance of storm water into the brook below the reservoirs. The embankments of the storeage reservoir were to be constructed on the most approved principles, at a slope of three to one on the inside and two to one on the outside. Since November, 1871, he had taken gaugings of the stream—daily, for the most part—in times of drought. At other seasons it was not necessary to keep such strict accuracy, in consequence of the volume of water passing down. The daily average of the gaugings for the present year, which has been regarded as the driest for some time, was as follows:—January, 1,667,072 gallons; February, 1,016,354; March, 404,634; April, 459,505; May, 237,584; June, 123,171; July, 113,488; August, 126,844; September, 295,742; October, 404,456. The minimum daily flow during the above period, from 1250 acres, was 101,574 gallons; from 1500 acres, 182,190 gallons. Supposing the scheme to have been in operation in 1873, there would have been, giving a daily consumption of 25 gallons per head for 11,000 persons, no less a quantity in the reservoir at the driest period than 16½ million gallons. In 1874, in September, the driest period, there would have been 13½ million gallons. Taking the daily deficiency at 79,800 gallons, there would have been 160 days supply at the end of September. It was possible, by means of properly constructed adits in the strata above the mill-pond, to procure a constant supply of water in sufficient quantities without having recourse to the storeage reservoir. He believed that the valley above the pond did not consist of the *débris* of ages, but indicated the existence of a geological "fault," for it was apparent that one side consisted of clay and the other of sand and gravel. He had not been able to bore into this, but he had "jumped" to a depth of 30 feet, and found that sand extended the whole distance. The site of the proposed works was 30 feet above the top of the water-tower in Market Street. It was proposed to utilize this tower or not, as was found most desirable. Its capacity was 60,000 gallons, and it was approximately 30 feet above the highest water-tap in any dwelling. In case of fire, an additional head of water would be obtained by delivering the water direct from the supply main, the whole length of which, from Haseley to the bottom of the Saltisford, would be about 5000 yards. The friction of the water in 12 and 10 inch mains had been calculated in estimating the probable head.

By the TOWN-CLERK: At present 300,000 gallons per diem, or 30 gallons per head, is being pumped. There is, however, great waste, caused from negligence, the imperfect arrangement of the rising main, and the leakage from water-closet connexions (from Emscote to the tower) at each throb of the pumps. The waste I calculate at more than one-third. I believe a constant supply would be more economical than one which is intermittent. In one of the districts of Liverpool the consumption was lately reduced from 40 to 17 gallons per diem by the substitution of a constant for an intermittent supply. I have had meters placed at different establishments in Warwick, with these results:—At the barracks, the daily consumption for all purposes was 13·77 gallons per head; at Leycester's Hospital, 5·3; at the Lawn, the residence of the mayor, 20·5; at the Globe Hotel, 15·00; and at the Punch Bowl Inn, where there is a large carriage business done, 36·00 gallons. The cost of repairs to the pmping engines has been more than £200 within the past four years. A new boiler will soon be needed, as the plates of the present one are worn very thin. This outlay would be £500 or £600. The pumping expenses have lately been considerably augmented in consequence of the increase in the price of coal.

By the INSPECTOR: I estimate the annual expense of the new scheme, after it is in operation, at £130—£52 the wages of an attendant at Haseley; £10 8s. the turn-tap; £30 incidental expenses; and £37 12s. the rates payable to those parishes through which the main passes. Supposing the storeage reservoir and filter-beds were done away with by the adits driven into the land, the total initial saving would be not less than £4000.

By Mr. SANDERSON: If the present supply were continued, a new rising main, two reservoirs, and improved filter-beds would be required, at a total cost of not less than £10,000. The supply would certainly then be improved, but it would still be intermitent. A new rising main would obviate the waste from the throb of the pumps, because the district of Emscote would be supplied after the water has been to the tower in Market Street, and not while it was on its way thither. I estimate the cost of the Haseley scheme at £17,500—land, and compensation, £2500; legal and engineering expenses, £2000; and actual cost of material and labour, £13,000. The compensation to the owners of Haseley and Kenilworth mills is included in the estimate, but not that to riparian owners. They are provided for in the Act of Parliament. I cannot tell you how many there are on the banks for the 20 miles provided in the Act. I believe, however, that there are four legally entitled to compensation. The mills below the point of abstraction are—Haseley, Kenilworth, Blakedown Guy's Cliff, and the Rock mills. I estimate that the loss in power to the Kenilworth mill would be about half a horse power per diem the year through. I have made no calculation of the money value of this power, and I do not know that the Kenilworth owner has demanded £1000 as compensation, in addition to the 10,000 gallons per day given by a clause in the Act.

Mr. *Baker* (firm of Baker and Brown, solicitors) said that the Rugby Local Board of Health took 300,000 or 400,000 gallons per day from a steam in their vicinity, and only paid about £120 as compensaiton. The London and North-Western Railway Company also abstracted a less quantity from the same stream, and only paid £10. The comparison between the quantity taken and the compensation to millowners was, he knew, very small indeed. A great deal would, however, depend on the description of water-wheel, whether it was overshot or undershot.

Cross-examination of Mr. *Pritchard* continued: I estimate the increase in the population as very slight; perhaps 300 in two or three years. From 800 to 1000 militiamen train here annually for two or three months. I do not know whether there will be a very large increase of population in consequence of the new schools which are to be erected. I consider the provision of 25 gallons per head to be sufficient. There ought not to be a greater consumption in summer except through carelessness. Other and eminent engineers have given lower estimates. Mr. Hawksley has mentioned 25 gallons as a sufficient average for London. It is according where you make the "selection" from their examination before the Royal Commission that you find the quantity greater or less. Ten or 12 gallons per head are allowed for consumption, and the rest for waste. There would be no difficulty in preventing waste; the Town Council and the magistrates are the authorities to do that. The present supply is an intermittent one of 15 hours out of the 24; and the supply is 30 gallons per head. I propose to reduce that average quantity by a constant supply and the exercise of greater supervision in preventing waste. Sixty thousand gallons per day were saved on a spurt a short time ago by an inspection of all taps and cocks. A constant supply would save at least as much or more than this, because it is a practice for people overnight to draw off water in pans and other vessels for use in the morning. If the water happened to be on when required the following day, the contents of the receptacles were thrown away. It is necessary sometimes to flush the main sewers, in consequence of their unscientific construction For example, a portion of one of the main sewers has a reverse fall. There would not be much waste of water from this practice, because it was useless to flush a sewer which had a "head" of 3 or 4 feet. Whether the point of abstraction of the water at Haseley was above or below the mill, there would be a minimum supply daily of 150,000 gallons. The least daily quantity which flowed over the head sill from 1250 acres of watershed was 101,500 gallons, not 90,000. This was during the past summer. The years 1868 and 1870 were not considerably drier than the past season. There is no provision made for an extension of the reservoirs. Had I dealt with evaporation in my tabulated calculations, the results would have been more in my favour. No vegetation would be produced at the bottom of the reservoirs, because of the depth at which I propose to construct them.

By the TOWN-CLERK: It is only during eight months of the year that interference with the millers would be necessitated. During the other four months there would be an abundance of water and to spare for all requirements

Dr. *George Wilson*, medical officer of health, put in a report furnished to the Town Council some time since, from which he read extracts to the effect that the present supply from the Avon was highly objectionable, because of bad filtration and sewage pollution; and that the Haseley water was better and more economic. From these and various other reasons, founded on a qualitative analysis, he strongly recommended that, in the interests of the health of the inhabitants, the Haseley scheme be carried out forthwith.

By the INSPECTOR: I think the Haseley supply would be sufficiently pure without filtration if it were derived solely from drifts; but if the storm water were also taken I should decidedly say provide filter-beds.

By Mr. SANDERSON: The report I made to the council was furnished after I had been appointed about three weeks; but I did not make it without very careful consideration, nor am I in the habit of giving my opinion without due examination of the question before me. The watershed is arable and meadow land for the most part. The sanitary Acts give power to prevent pollution; and if the watering of dairy stock could be proved to be a source of pollution it could be prevented. I do not consider the manuring of land would prove detrimental to the water draining from it, remembering the precautions provided to purify it. There are other purifiers besides filter-beds. Of course rain water is to be preferred to surface water; but if you cannot get rain water, the surface water in the Haseley Brook is far better than the Avon water, because of the sewage pollution which in times of flood cannot be prevented from flowing into the river from Coventry and Kenilworth. I do not regard the water from drifts 9 feet below the level of the land as surface water. In its passage through the earth down to the drift it would be filtered. You can always procure an unobjectionable supply from agricultural land by filtering it. Organic matter is, to a certain extent, removed from the water by its passage through sand filters.

By the INSPECTOR: If they are used alternately, as is proposed in the scheme.

Dr. *John Tibbits* said that during his professional experience, extending from 1854 to the present time, he had had ample opportunities of ascertaining the injurious effects resulting from the Avon water. So bad was it, in his opinion, that he considered it his duty to advise all his patients to avoid drinking it if they could possibly procure any other water. That opinion he had seen no reason to alter; in fact, the water had lately become worse instead of better. The quality of the supply had been a source of constant complaint by all classes of inhabitants; and as an indication of public opinion the witness quoted two extracts from the *Warwick Advertiser*, both of which condemned the supply as most deleterious.

By the INSPECTOR: The death-rate of the town has been gradually decreasing since 1851, as shown by the Registrar-General's Report. The town was placed under the Sanitary Acts in consequence of the death-rate from cholera in 1847 being one more than the number allowed by the Act. At the time that the authorities applied to Parliament to be placed under the Acts, there was a very keen contest whether the water supply should be obtained from the Avon or from the source now proposed. It was eventually decided to take it from the Avon.

Mr. SANDERSON: You say that since the present water supply has been in operation there has been a gradual decrease in the death-rate?

Witness: I do not attribute it to the water.

The INSPECTOR: Are you going to contest the purity of the river water?

Mr. SANDERSON: I have no materials in my possession to enable me to do so.

Cross-examination of Dr. *Tibbits* continued: The inhabitants have been urging the Town Council to take action for a long period; but, as soon as they learnt the expenditure likely to be involved, they took alarm, and very naturally a strong opposition was manifested. The inhabitants have had every possible opportunity of knowing the course proposed to be taken by the Town Council.

The INSPECTOR inquired whether the inhabitants opposed the passage of the Act through Parliament.

The TOWN-CLERK replied that they did not; and then explained in detail the different steps which had been taken by the council since August, 1871. It was not until November that the council resolved to go to Parliament; and, in the meantime, the public were informed of the steps taken by newspaper reports of the meetings of the council.

Mr. *William Clifford*, town councillor, of Emscote, thought that provision should be made for at least 13,000 population, seeing that they proposed to extend repayment of the cost of carrying out the scheme over 50 years. The present consumption was 30 gallons per head, and he did not see how it was to be reduced to 25.

The INSPECTOR: Do you say it cannot be reduced?

Witness: Nothing has been said to show that it can be reduced below the present average. I was in Liverpool at the time the reduction mentioned by the engineer was canvassed, and I do not believe it was as great as is alleged. Then, again, the question of storeage; all authorities agree that the consumption is larger in summer than in winter, and it accords so with common sense that I do not see how any engineer can assert the contrary.

The INSPECTOR: I do not understand that Mr. Pritchard says so.

Mr. PRITCHARD: I never said anything of the sort. I said that I provided 12 gallons for use and 13 for waste.

The INSPECTOR: The engineer says that the greater part of the waste arises from the defective pumping arrangements.

Mr. CLIFFORD: Well, I live in the lowest part of the town, and, although I have carefully watched the various taps in my house, I have been unable to perceive any waste. Besides, if waste is to be prevented, it will involve in time the general use of meters. If everybody is, under the powers of the council, to take water by meter, as little as possible only will be taken, and recourse will be had to pumps. The water in these, from the fact of being derived from a sandstone formation, is excellent; and it is only where it comes from the "drift" that it is bad. I should use pumps, and several other members of the corporation would do the same. The result would thus be to increase the rates. The same thing has been done in Milverton, and the result has been an increase of the rates. I will tell the ratepayers this, for their satisfaction, that the water-rate will increase 40 or 50 per cent.; and that the result of carrying out the present scheme will be an addition of £400 a year to their present burdens. The annual charge on the account of the new works will be £814; the expenses, £130; and the produce of the water-rate, £250.

The INSPECTOR: I do not quite follow you.

Mr. CLIFFORD: My argument is against the use of meters.

The INSPECTOR: That is, supposing the authorities resolve upon using them.

Mr. CLIFFORD: They have taken powers to do so.

The INSPECTOR: Meters to every house?

Mr. CLIFFORD: Well, all the larger houses; all those above cottages.

The INSPECTOR: In other towns I find that large houses do not consume more than 5 or 6 gallons on an average.

Mr. CLIFFORD: They do no laundry work at home, perhaps; or not much bathing.

The INSPECTOR: But if they can get a nice pure soft water for bathing by taking the town water, they would surely use it in preference.

Mr. CLIFFORD: I only speak of Milverton, where they take water by meter. I say that it is impossible to reduce the average below 30 gallons in a town like Warwick, where nearly every house is connected with the sewers by the water-closets. With regard to the flow of the brook there is a great difference of opinion. I maintain that this scheme is based on the quantity of water that enters the mill-pond, and not the quantity which flows below this point. Messrs. Cawley and Newton based their report on the quantity which entered the pond for the miller's purpose.

The INSPECTOR (reading): "They made provision to draw into a culvert all the water that now collects in the stream down to the lower end of the second reservoir."

Mr. CLIFFORD: That is as the scheme now stands, not as it stood.

The INSPECTOR: I have nothing to do with that.

Mr. CLIFFORD: I maintain that there are 50 or 60 acres of bog land, at a level of 16 feet above the point of abstraction, and that the water drains from this.

The INSPECTOR: But by removing the "fletcher," you can get all the water out of the land.

Mr. CLIFFORD: Do you say that 50 or 60 acres of boggy land will drain out in three or four weeks? We maintain that a portion of the increase at the lower level is the drainage from the land 16 feet above it.

The INSPECTOR: Do you mean to say that a portion of the water passing over the upper weir is measured again at the lower weir?

Mr. CLIFFORD: Yes.

The INSPECTOR: But the fletcher-door is shut?

Mr. CLIFFORD: I say that the accretion of water at the lower level is owing to leakage from the upper ground.

The INSPECTOR: I cannot see any force in the argument, remembering that the quantity at the upper weir is not included in the estimate.

Mr. CLIFFORD: I say that there is approximately not more than 100,000 gallons from the upper weir.

Mr. PRITCHARD: I have only measured the water below when the fletcher was removed. It would thus be impossible to measure it twice.

Mr. CLIFFORD: Another great objection is that the water is carried direct into the filter-beds, and that it would be polluted with animal matter in a precisely similar manner to the present supply. There is no provision for storing "subsoil drainage water," as I may call it. I admit that there is an accretion of water all the way down, which I suppose comes from the surface of the land. Drift water has always been condemned for the supply of towns. The ground in the vicinity of Haseley is very porous, and the excreta of animals and manure from the land would be carried into the reservoir.

The INSPECTOR: I entirely differ from you in the opinion that what comes from very deep drains can be called surface water. Supposing you are correct that the water which is found in the brook is very impure, it certainly will not be more impure in drains 10 feet deep than at the surface. The water in the brook has been analyzed, you know.

Mr. CLIFFORD: We do not believe it; but we accept it. If we could have an analysis made by Dr. Frankland, for instance, we could believe and accept it. We do not believe in the great difference between the Avon and the Haseley water.

The INSPECTOR: You should have come prepared with evidence useful to you. What you say I cannot take as evidence. You assert that the water from Haseley is not good.

Mr. CLIFFORD: I am saying that the water is very little better than that from the Avon. I have not, however, analyzed it.

The INSPECTOR: Well, I am quite certain that it is likely to be more unobjectionable. The corporation have supplied the Local Government Board with an analysis of the water from the brook, and from that analysis the water appears to be very good. I am perfectly satisfied that water taken from below the surface would be still better.

Mr. CLIFFORD: I should object to the surface water being taken from the land, and carried out at once from the large reservoir into the filter-beds.

The INSPECTOR: But it will only be carried away as it is wanted for the supply of the town.

Mr. CLIFFORD: The object of the ratepayers is to have this work carried out efficiently at the beginning, so that they shall not be called upon to pay £8000 or £10,000 hereafter. The question of cost has nothing now to do with it. If they can secure an average pure water, that is enough; but I submit that water from that bog will never be anything better than surface or bog water.

The INSPECTOR: You should have been prepared with a good analysis. You first of all raise a point, and then, when I want to get you to argue it, you "shy" away.

Mr. CLIFFORD: I do not want to "shy" away.

The INSPECTOR: You say that the water of the brook is impure?

Mr. CLIFFORD: I do not make that an argument.

The INSPECTOR: You say that it comes from agricultural land, and that it ought, therefore, to be impure, if it is not. Now, have you an analysis to show that it is impure?

Mr. CLIFFORD: If you had an analysis taken in time of flood, it would be shown to be highly impure.

Mr. PRITCHARD explained that the water was only proposed to be abstracted after its turbidity from recent storms had passed away.

Mr. CLIFFORD: There was a question raised just now about the drought of the present year being greater than for a number of years past. I produce a table which I have compiled, showing that the drought of 1868 and 1870 is greater. He (Mr. Clifford) then proceeded to read the table, and having done so, offered to furnish the inspector with a copy.

The INSPECTOR remarked that his opinion was that the quantity of water passing down a stream often depended more upon the preceding than the present period.

Mr. CLIFFORD: I wish to show that the intensity of drought was much greater in 1870 than in 1874. Six inches more rain fell in 1874 than in 1870. To support this I call upon Mr. Tomlin to give evidence.

Mr. *James Tomlin* said he was a miller, and carried on business at the Castle Mill, Warwick. During the 16 weeks subsequent to July, 1868, about half the quantity of water passed down the Avon to what flowed down in the same period of 1874.

By the INSPECTOR: I have not taken into account the flood water, which doubtless changed in quantity from day to day.

The INSPECTOR: You see the case of a stream supplied from deep-seated springs would be different. The Avon flows principally through a formation where there are few springs. It is chiefly supplied from surface water. The evidence I should like to have taken would be that of the miller upon the Haseley Brook itself. What he could have said would have been very useful.

Witness: The miller there told me he could not grind for one whole day together.

By the TOWN-CLERK: I gauge the flow of the river by the quantity of corn ground. There has been no alteration to the water-wheel, with a view of increasing its power, since 1868.

Mr. CLIFFORD called upon Mr. *J. Baly* to give evidence, but that gentleman declined to do so. Mr. Clifford then said that if any other gentleman desired to give evidence, then was the time to do so. No one, however, offered himself. Mr. Clifford then informed the inspector that the gentlemen concerned with him had lost the valuable evidence of Mr. E. Lloyd, engineer to the Warwick and Napton Canal, who had lived in the vicinity of Haseley for many years, in consequence of being called away by the recent death of his brother.

The INSPECTOR: The evidence of Mr. Tomlins would have been very valuable had he been the miller resident at Haseley.

Mr. CLIFFORD: They are lying in wait at Haseley. We shall no doubt have them hereafter; they will not help us now. But we are in for it, we are in for it.

The INSPECTOR intimated that if there was no more evidence he should conclude the inquiry.

The TOWN-CLERK thanked Mr. Harrison for the courtesy and kindness with which he had conducted the inquiry, and it then concluded, after having lasted nearly seven hours.

HINCKLEY GAS SUPPLY.—At the meeting of the Hinckley Local Board, on the 10th inst., a letter was read from the secretary of the gas company, stating that some of the shareholders had complained about the low price for which the directors had offered to sell the works. As, however, they had offered it, they would not withdraw their offer, but give the board the option of purchase until the 21st of December next; but after that date they would not consider themselves bound to their offer. The chairman said he thought it very right on the part of the company to do so, as it was quite time they came to some conclusion on the matter. Mr. Hall said it was supposed that the profits would pay 6½ per cent. on an outlay of £13,000, while if they purchased them at £17,500, it would only pay 4½ per cent. The clerk said they had no power to buy without an Act of Parliament, which would cost about £450. They could borrow the money at 4½ per cent., payment to extend over 50 years. It was resolved to leave the gas and water questions to the consideration of the committee appointed for the purpose.

THE GAS QUESTION AT BARTON.—A meeting of the ratepayers in the Barton Local Board district was held at the Co-operative Hall, Eccles, on the 3rd inst., for the purpose of considering the desirability of applying to Parliament for powers to establish gas-works in the district. The clerk (Mr. G. Trenbath) produced statistics at the board meeting on the previous evening, showing that if they established gas-works of their own, instead of obtaining their supply as at present from the Salford Corporation, the price of gas would be reduced 1s. per 1000 feet. The cost of the gas consumed in the district was now £9000 a year. Mr. H. Leigh (chairman of the Barton Local Board), presided, and there was a good attendance of ratepayers and property owners. The chairman said the board had thought it would be a very considerable saving to the ratepayers if they made their own gas instead of paying 4s. 8d. per 1000 feet for it, as they now had to do. It was thought desirable also that the local board should take the matter up, instead of letting the undertaking get into the hands of a private company, so that whatever profits accrued from the proposed gas-works should go into the public purse. The clerk read a statement showing that the board could make their own gas at 3s. 8d. per 1000 feet. Mr. H. Boddington moved—"That this meeting consents to the promotion by the Board of Health, in the next session of Parliament, of a bill for the purpose of empowering that board to construct gas-works, and manufacture and supply gas, and acquire land for these objects, to be promoted at the cost of the general district rate. He said there was no doubt the price they had to pay for gas to Salford was excessive, as they had conclusive evidence that Manchester made a very large profit out of the price they charged. If they could make their own gas in this district at 3s. 8d. a profit would be made which might be directed to the improvement of the locality, which had now a population of 17,000, with 4000 inhabited houses. The motion was seconded by Mr. S. Pimlott, and carried. One or two speakers referred to the probability of opposition to the scheme on the part of the Salford Corporation, and advised the board to negotiate with them before the passing of any resolution; but it was stated that the board had already endeavoured to do this, and that they had been slighted by the corporation.

FOREIGN AND COLONIAL GAS COMPANY, LIMITED.—Another petition to wind up this company was presented to the Court of Chancery on the 13th inst. The petitioner is Mr. David Hulett, of Holborn, a creditor of the company, and the petition is directed to be heard by Vice-Chancellor Malins on the 4th proximo.

VALUE OF SUBURBAN GAS AND WATER SHARES.—Messrs. Newbon and Harding sold at the City Auction Mart, on the 17th inst., £2010 capital stock in the Kent Water-Works Company, which realized £2804; also 164 shares of £5 each (paid up) in the Woolwich Consumers Gas Company, for £1539, and 41 shares of £5 each (£2 paid up) in the same company for £175.

HEBDEN BRIDGE GAS COMPANY.—An extraordinary meeting of this company has just been held, at which it was resolved to issue £3000 worth of new stock. A few weeks ago the company gave notice that they intended to raise the price of meters to those who hired them from 2s. to 4s. per year, the proposal meeting with no little opposition. The directors have come to the conclusion to reduce them to the old rate.

EDINBURGH AND DISTRICT WATER TRUST.—The report of the superintendent for October shows that during the month the inspection for checking waste was carried on simultaneously in the twelve divisions into which the city and districts have been divided. 12,030 apparatus were examined, of which 11,390 were found good and 640 faulty or in a state of disrepair. The waste of water checked was equal to 36¾ gallons per minute. The number of houses examined was 4462, and the number of the occupants thereof was 21,068 persons. The quantity of water sent into the city and districts amounted to 873·56 cubic feet per minute, which is equal to 7,839,397 gallons per day, and which, to a population of 270,300, gave a supply of 29·03 gallons per head per day. The average supply in Edinburgh was 29·11 gallons per head per day to a population of 216,648. In Leith the average supply was 28·52 gallons per head per day to a population of 47,940; and in Portobello the average supply was 28·53 per head per day to a population of 5712.

PETROLEUM IN GERMANY.—The discovery of petroleum springs on the Lüneburg Heaths in Northern Germany promises to convert this once barren and apparently unavailable tract into what might by comparison be designated as an El Dorado. Borings were made at Oberg by Hanoverian and French surveyors as early as 1863, but then the measures taken failed to confirm the opinion which had been previously advanced of the presence of oil. Since then the heath has been drained and rendered fit for cultivation, and recently it has been shown that petroleum can be obtained by simple borings, and that at some spots, as at the village of Wietze, the sand is saturated with rock oil. In this part of the heath since 1852, when the owner of the land caused a shaft to be sunk, petroleum has been obtained without intermission, although the process adopted for its extraction has consisted in little more than a mere washing of the sand, through which the oil was suffered to run into vessels prepared for its reception. In clearness, purity, and specific weight the Lüneburg oil is said to be identical with the American rock oils, and it is almost without smell of any kind.—*Academy.*

GAS EXPLOSION AT BOURNEMOUTH.—An explosion of gas took place at the house of Miss Orred, Christchurch Road, last Wednesday morning, of so serious a nature as nearly to have been attended with fatality. The cause of the accident was the same "old story," The butler, hearing that there was a smell of gas in the dining-room, took a candle, or applied a lighted match to the source from whence he expected the leakage, but was soon warned of his folly by seeing the gas ignite. Luckily for him he had the presence of mind to run out of the room before the explosion occurred; as it was, his face was badly burnt, and his whiskers played great havoc with. The result of the explosion in the dining-room was to shatter the window glass, rip up some old oil paintings, and blow the door completely into atoms; even the uprights were shaken out of place. Some of the furniture was broken, and the curtains set on fire, besides other minor damage. It would seem the concussion of air from the explosion was only felt in one direction, as a pier-glass opposite to the door stood uninjured. Immediately opposite the dining-room door, on the other side of the passage, stands another, and the panels of this were smashed. In the butler's pantry, situate some distance from the dining-room, down a passage, the force of the explosion was felt, all the windows and some glass being smashed. In some of the rooms the plaster was shaken off the ceilings, and nearly every window in the house suffered more or less. We are glad to hear that Miss Orred, who was naturally greatly alarmed, has recovered from her illness occasioned by the shock. The butler, who has suffered great pain, is also recovering; he is to be congratulated upon having come out of the affair with his life.—*Bournemouth Visitors Directory.*

PRECAUTIONS AGAINST FIRE IN WESTMINSTER ABBEY.—On Friday, the 13th inst, the extensive alterations and improvements which the Dean and the Chapter of the Abbey of Westminster have for some months past been effecting for the protection of the abbey from fire were completed, and subjected to such a test as fully proved their adequacy. Under the personal superintendence of Mr. Thomas Wright, the clerk of the works to the dean and chapter, a huge tank, capable of containing 6000 gallons (which will always be kept charged), resting on strong timber beams, 18 inches square, has been erected in the south-west tower at an altitude of 160 feet from the ground. This tank is supplied directly from the main, which the Chelsea Water-Works Company have enlarged at their own cost, and pipes from this have been carried up the north-west side of the abbey to the triforium level, passing thence through the roof to the south-west tower; thence further pipes pass along the roof, with hydrants, and hose always attached at every point of vantage, so that at the first alarm of fire one man be will able unaided to turn on the water to any point of danger. A second series of pipes run from the triforium along the roof to Henry VII.'s Chapel at the entrance to which a standpipe has been fixed. Both of these pipes have been fitted up with double hose and hydrants. The entire cost of the works amounts to upwards of £2000, and from the test applied it was proved that without any aid from the Fire Brigade a continual supply could be kept up for over an hour, and the pressure is of sufficient force to cast a full jet over the abbey roof, and also the lantern. A public display, it is believed, will be made in the course of a few days.

SHREWSBURY GAS SUPPLY.—At the adjourned annual meeting of the Shrewsbury Town Council a report was submitted from the Gas, Water, and Lighting Committee, in which the following passages occur:—"With reference to the gas, as supplied to the public lamps in the borough, your committee have received from Mr. Blunt, the tester appointed by the council, monthly reports of the illuminating power and the pressure. From these reports it appears that since the testing commenced in September, 1873, the pressure of the gas has much improved, and must now be considered good; it averages more than one inch during the day, and rises to considerably over two inches during the most important hours of the night. The illuminating power, as shown by the photometer (which is of the character required by the Act of Parliament), has averaged 15·03 candles, during the twelve months ending the 31st of August last. This illuminating power, your committee, however, think it right to observe, is to a certain extent an arbitrary one, as the burner that is prescribed for use upon the photometer is not suitable for private use, and that when the gas is tested with a bat's-wing burner of the same character as applied to the public lamps, and the same quantity of gas is passed through it as is required by the Act to be consumed—namely, 5 cubic feet per hour—the illuminating power is 1½ candle less than is shown by the prescribed burner. Thus the average illuminating power of the gas in the public lamps would be 13½ candles. The standard of the Shrewsbury Gas Company is a low one—12 candles—and the gas supplied is therefore well over the standard; but your committee cannot say that it is altogether of a satisfactory character. The present arrangement between the corporation and the company for the supply of the public lighting is £3 7s. 6d. per annum per lamp with bat's-wing burner, and £1 19s. 9d. per annum per lamp with fishtail burner. Each bat's-wing burner is to emit a flame 2 inches high by 4 inches wide, and is estimated to consume 5 cubic feet per hour for an average of 9 hours per night for 365 nights in the year; and the fishtail burner is to emit a flame 6 inches high, for a like number of hours, and is estimated to burn 2 cubic feet per hour. In consideration of these sums per lamp the company undertake the expense of lighting and putting out, cleansing and repairing, and the fixing the lamp-columns. The number of public lamps in the borough now are—Bat's-wing burners, 408; fishtail burners, 23; total, 431 With a view of testing the quality of gas now actually consumed by each bat's-wing burner lamp, your committee have made arrangements with the gas company, whereby two lamps selected by the committee and two lamps selected by the company will be fitted with meters, and an accurate account taken for one month. The result of this test will be communicated to the council as early as possible."

Register of New Patents.

949.—GEORGE, R., Worcester, "*Improvements in taps, valves, and stop-cocks.*" Patent dated March 17, 1874.
This improvement consists in so constructing the taps, &c., as to bring the fluids or vapours in contact with an air vessel which may be converted into a measuring chamber; also in combining stop and bib in one and the same tap, by stopping the outlet when the inlet is partially open.

986.—BURDEN, J., Birmingham, "*Improvements in steam-gauges, pressure-gauges, and vacuum-gauges.*" Patent dated March 20, 1874.
According to this invention the pipe conveying the steam, atmosphere, or liquid to the gauge is placed at the highest part of the gauge, and the diaphragm chamber and the passages leading thereto are filled with quicksilver or mercury, upon which the steam, atmosphere, or liquid presses. This pressure is transmitted through the quicksilver or mercury to the diaphragm. The steam, atmosphere or liquid is thus prevented from coming into direct contact with the diaphragm and oxidizing and injuring it. Or the mercury may be placed in the bent part of the syphon-pipe of the gauge instead of in the chamber. The accumulation of water in the gauge and the bursting of the gauge is thus prevented.

991.—HOWARD, J., Camberwell, Surrey, "*A new self-acting apparatus for regulating the supply of water, and disinfectant for flushing and disinfecting water-closets.*" Patent dated March 21, 1874.
The features of novelty which constitute this invention are the employment of the pressure of the incoming water as a motive power for disinfecting and flushing water-closets, also in discharging the disinfected contents of the closet-pan, and subsequently using the water from which the power was obtained for disinfecting and flushing the closet at the next operation. This machine also regulates the quantity of water used, and secures a complete mixing of the water, and the disinfectant in due proportions. The machine is set in motion by pressure upon a hand knob.

993.—LOCKWOOD, W., Sheffield, "*Improvements in valves for regulating the pressure of steam, air, water, or other fluid.*" Patent dated March 21, 1874.
The novelty of this invention consists in arranging within a chest or casing, two compound balance safety-valves, in coupling them together by one lever, and balancing them by one weight. The action is that the pressure of the steam, air, water, or other fluid within the chest or casing forces both valves outwards, and the one weight by means of its lever brings them both back when the internal pressure is sufficiently relieved.

1002.—SMITH, A., Loughborough, Surrey, "*Improvements in the means for purifying water.*" Patent dated March 23, 1874.
This invention consist in the use, for purifying water, of the hydrated silicates of magnesia, alumina, iron, lime, baryta, or manganese. A small quantity of one of the silicates being mixed with the water and allowed to subside, the lime contained in the water will be precipitated.

1015.—KILPATRICK, J., Barrhead, N.B., "*Improved constructions of gaseliers and reflectors, which latter are also applicable to other lights and gas-jets.*" Provisional protection only obtained. Dated March 24, 1874.
This invention consists in the construction and arrangement of gaseliers and other three to eight branch lights, with a new or improved construction of reflector placed in the centre of these lights, having as many polygonal sides in the plan view as there are lights, one reflecting face opposite each light, but made in a hollow segmental form in the side elevation or sectional view, by narrow horizontal parallel strips of glass laid close together, edge to edge, silverized on the back, so as in reality to form each polygonal face in the curved direction; also in the construction of flat reflecting faces, of the width of the narrow strips, which may vary according to the quickness or flatness of the curve, as from one inch to three inches, as desired.

1017.—ATKINSON, J., Islington, Middlesex, "*Improvements in the means of or apparatus for stopping and regulating the flow of air, gases, or liquids through elastic pipes.*" Provisional protection only obtained. Dated March 24, 1874.
This invention consists in the use of sliding apparatus externally compressing and internally closing (more or less) elastic pipes, by forming a compressed bight or bend.

1027.—POUT, P. G., Balham, Surrey, "*Improvements in apparatus for regulating and measuring the flow and discharge of water or other liquids, for preventing waste thereof applicable to water-closets and other purposes.*" Provisional protection only obtained. Dated March 24, 1874.
This invention has for its object improvements in apparatus where it is desired to discharge a given quantity of water or other liquid at intervals. For this purpose a short cylinder truly bored is arranged, in which a piston is moved up and down by a piston-rod and lever attachment. A valve seating is formed in the body of the piston, the passage being opened and closed by means of a valve on the end of another rod, the other end carrying a valve which opens and closes the outlet passage from the measuring chamber.

The above apparatus is fitted into a chamber which holds the desired quantity of liquid required for each separate discharge, and may be either fixed in the cistern or reservoir from which it is intended to regulate or measure the liquid, or a small supply cistern may be formed in or upon the chamber, and supplied by a ball-valve or otherwise.

The action is as follows:—On the piston-rod being lifted, the inlet valve to the measuring chamber is first closed, and on the upward motion being continued, the outlet valve is opened, thus emptying the chamber containing a measured quantity of liquid. No more liquid can then enter the chamber until the inlet-valve is opened, which cannot take place until the outlet valve is closed, thus limiting with certainty the quantity of liquid discharged at each operation. The pressure of water effectually keeps the valves tight and free from leakage.

In place of the cylinder and piston a flexible diaphragm may be employed, arranged to act in combination with inlet and outlet valves, in like manner to the arrangement described.

1041.—LEDINGHAM, A. W., Aberdeen, "*Improvements in cleaning gas retorts, and in apparatus therefor.*" Provisional protection only obtained. Dated March 25, 1874.
This invention consists in directing a strong current or jet of atmospheric air against the carbonaceous deposit which adheres to the inside of the retorts, the

accumulation of which seriously diminishes the efficiency and capacity of the retorts.

The application is made whilst the carbonaceous deposit is in a red hot state, by means of a pipe or nozzle introduced at the open end of the retort, and directed by the operator in succession to the different parts of the deposit. The pipe or nozzle has a screen or cover partly closing the mouth of the retort, and protecting the operator from the gases and incandescent matters ejected from the retort. The air may be supplied to the pipe or nozzle by means of any suitable known kind of blowing or air-forcing apparatus. A current of air, corresponding to a pressure of about 12 inches of water, is found in practice to answer the purpose, but the time required for the operation may be reduced by increasing the strength of the current. By the application of the present invention a retort can be cleaned in about one-twelfth of the time hitherto generally required.

1043.—Colebrook, C. T., Islington, London, "*Improvements in pump-valves.*" Patent dated March 25, 1874.

This invention consists of an improved method of forming and applying the suction and delivery valves of ordinary double-action pumps. The valves are formed by folding, joining, rivetting, hingeing, or similarly shaping or connecting together one or more piece or pieces of leather, rubber, canvas, metal, or any suitable material, in such a manner as to form a kind of X or Y shaped figure (or any modification of such shaped figures) in cross section. The whole number of valves are thus combined and formed in and of one completed piece; and this piece is applied simply by sliding it between properly shaped parts of the valve-box, and retaining it in position by its cover.

1052.—Jensen, P., Chancery Lane, London, "*Improvements in the manufacture of gas, and in apparatus therefor.*" A communication. Patent dated March 25, 1874.

This invention relates to the manufacture of gas from petroleum or other crude or refined hydrocarbon oils. Heretofore danger and difficulty have attended the manufacture of gas from such substances (alone or in combination with other gas-producing materials), owing to the inflammable nature of the substances. This danger and difficulty are obviated by this invention.

Retorts or ovens, made of clay, bricks, iron, or other suitable material, are set over a furnace horizontally, vertically, or at an angle. Pieces of fire-clay, fire-brick, or other suitable porous refractory material are saturated with petroleum or other crude or refined hydrocarbon, which may be in the cold state, or, by preference, in a more or less heated state. The pieces should be of a suitable size and form, and by preference of a cylindrical or spherical shape. They may be saturated by simple immersion, or by means of vacuum produced by a pump or otherwise. Other porous substances, such as wood, peat, or asbestos, may be employed. The pieces so saturated are then coated with a thin solution of silicious or other substance for the double purpose of retaining the hydrocarbon in the saturated pieces while in stock, and in order to prevent the production and escape of gas before the retorts charged with such saturated pieces are closed.

It is found in practice that the gas produced from such hydrocarbons is too rich for ordinary illuminating purposes, and it is therefore proposed to introduce hydrogen gas (which may be conveniently obtained from superheated or other steam) into the retorts during the time of gas production, in order to mix or amalgamate with the hydrocarbon gas evolved. The mixture may, however, be accomplished in other or separate chambers. Gas produced from the saturated pieces, combined or not with hydrogen gas, may be mixed with lighting gas produced in any other known manner, in order to enrich the quality of the same by commingling at a high temperature.

1055.—Nield, T. A., Dukinfield, "*Improvements in taps or valves adapted for use in controlling the flow or discharge of steam and other hot fluids.*" Patent dated March 26, 1874.

According to this invention a steam-tap is formed with a fixed plug and an outer revolvable shell, in which is formed an annular passage through which the steam flows when the tap is opened. When applied as a steam-tap, the hot water flows through a hollow lever into a float, and is discharged through a lower orifice.

1061.—Brown, M. H., New Cross, London, and White, M. G., Landport, "*An improved disinfecting and deodorizing apparatus for water-closets and other purposes.*" Patent dated March 26, 1874.

The feature of novelty of this invention consists in causing a given quantity of disinfecting fluid to flow into the pan of a water-closet, the fluid being contained in a small cistern placed over the seat, and measured out into a tube connected with the pan by means of a pipe with a bowl at the end, or a wheel with a series of bowls or scoops arranged round its periphery, such bowls or scoops discharging the disinfecting fluid into the pan of the closet by means of the tube each time the plug is released.

1066.—Keith, J., Arbroath, "*Improvements in the manufacture of illuminating gas, and in the apparatus employed therefor.*" Patent dated March 27, 1874.

This invention relates to the manufacture of illuminating gas from crude mineral oils, such as shale, American petroleum, or other similar oils, whereby the gas is thoroughly extracted from such oils; the apparatus employed consisting of an improved arrangement of furnace, retort, retort-setting, and washer. The furnace is of circular form, constructed of brickwork and fire-clay, and provided with a heavy circular metal grate and water-pan of brick built into the masonry beneath. The fuel for the furnace is fed into it by means of a slanting shaft entering at the bottom side of the fire instead of at the top, in order to prevent the ingress of cold air and consequent cooling of retort or lining, as by this arrangement of the feeding-shaft any air getting in while the furnace-door is open has to pass upwards through the whole body of the fire before it reaches the retort-setting, by which time it has become sufficiently heated or burned in its passage through the fire.

The retort is made of metal of an equal thickness throughout, and is flat bottomed, with circular or rounded sides and top, its outline being in the form of an inverted bowl. The retort may also be constructed, if desired, of fire-clay. It has a perforated partition in the centre, dividing it into an upper and lower division, both of which may, when desired, be filled with coke or charcoal to give greater heating and distilling surface. Two slanting shafts are cast one on each side of the retort, one sloping into the lower division and the other from off the upper division. When the retort is properly heated the oil is run in in a thin continuous steam from a contiguous metal cistern through a pipe-trap into the lower shaft, and passes off in the form of gas through the upper shaft. It then drops through a pipe into the washer, and may be passed direct by suitable connexions into the gasholder without purification. If desired for greater purity, it may be passed through an intermediate vessel of any desired form containing a layer of coke or charcoal for the purpose of clarifying it. This retort can very easily be cleaned, being provided with suitable doors, clamps, and screws fixed on the extremities of the slanting branches or shafts before referred to. Doors are also arranged round the setting of the retort to enable the attendant to watch the heating operation. The retort being itself flat bottomed, rests upon an arch with flat roof, thus ensuring great durability, as in no part is the heat of the furnace allowed to impinge directly upon the retort.

The washer is of circular or cylindrical form, with flat top and bottom, and is composed of metal. It is provided with both an overflow and discharge pipe, and is also fitted with a cleaning-out door and plugs on the top. The connexions or pipes between the retort and the washer are fixed, and pass from the retort directly through the top of the washer, no lutings or moveable connexions being required.

The retort, furnace, and setting are enclosed in a metal casing, and surmounted or covered with a metal top plate, through which the smoke-pipe passes to the chimney or other exit. This arrangement of apparatus is peculiarly adapted for manufacturing gas on board ship, and when so used the only alteration necessary is the application of a swinging instead of a fixed washer.

APPLICATIONS FOR LETTERS PATENT.

3829.—Dodge, J., Eccles, near Manchester, Lancs, "Improvements in apparatus for exhausting or forcing air and gases." Nov. 6, 1874.
3843.—Marchant, E. M., Kirby Street, Hatton Garden, London, "Improvements in the manufacture of gas." Nov. 7, 1874.
3859.—Harding, T., Bristol, "Ventilating sewers, shafts, and stacks, and consuming, destroying, disinfecting, or deodorizing the vapour or sewer gas arising from sewers." Nov. 9, 1874.
3867.—Wright, F., Millbank Street, Westminster, "Improvements in gas-governors." Nov. 10, 1874.
3868.—Matthews, H., Bristol, Gloucester, "Improved arrangements and apparatus for removing gases from sewers and effecting the consumption thereof." Nov. 10, 1874.
3876.—Forbes, Rev. G. H., Broughton, Northampton, "Improvements in the manufacture of artificial fuel." Nov. 10, 1874.
3882.—Parkman, E., Madison Co., Tennessee, U.S.A., "Improved means to be applied to lamps or lanterns to indicate the names of streets or other information, which means will also assist in reflecting the light from such lamps or lanterns." Nov. 11, 1874.
3889.—Ramsay, H. M., Amyand Park Road, Twickenham, "An improved method of making water-tight joints to pipes." Nov. 11, 1874.
3902.—Quin, J., Leyland, Lancs, "Protecting india-rubber valves, tubes, and other like articles from chemical action." Nov. 12, 1874.
3908.—Valentin, W. G., South Kensington, London, "Improvements in the treatment of spent oxide of iron for the purpose of extracting cyanogen compounds therefrom." Nov. 12, 1874.
3910.—Mather, W., Salford, Lancs, "Improvements in apparatus for measuring liquids for obtaining motive power, and for exhausting and forcing air and other gases and fluids." A communication. Nov. 12, 1874.
3917.—Preston, F. P., Prestige, J. T., Preston, E. J., and Fowler, J. A., Deptford, Kent, "Improvements in pumps." Nov. 13, 1874.
3918.—Lake, W. R., Southampton Buildings, London, "An improved ratchet-brace or drilling apparatus." A communication. Nov. 13, 1874.
3928.—Richards, W., Burton Road, Brixton Road, Surrey, "Improvements in instruments for measuring liquids." Nov. 14, 1874.
3938.—Evans, J., Wolverhampton, Staffs, "Improvements in pumps." Nov. 16, 1874.

GRANTS OF PROVISIONAL PROTECTION.

3717.—Chandor, J. A., New York, U.S.A., "Improvements in ignition fuses, and in the means for igniting the same, applicable to lamps, gas-burners, and other like purposes." A communication. Oct. 27, 1874.
3720.—Pollard, W., and Carter, J. E., Halifax, Yorks, "Improvements in the method of and apparatus for regulating the pressure and supply of gases and fluids." Oct. 28, 1874.
3751.—Mackay, G., Edinburgh, "An improved process of purifying liquids and recovering matter contained therein." Oct. 30, 1874.
3778.—Turton, S., Jolley, W., and Birchall, J. T., Heaton Norris, Lancs, "Improvements in diminishing valves or apparatus for regulating the pressure of liquids and fluids." Nov. 2, 1874.
3782.—Newton, A. V., Chancery Lane, London, "Improvements in means for lighting illuminating gas and in fulminating compounds applicable thereto, and for other purposes." A communication. Nov. 2, 1874.
3784.—Vallé, B. H., Stow-on-the-Wold, Gloucester, "Improvements in the treatment and utilization of sewage and in means employed therein." Nov. 3, 1874.
3792.—Fogarty, T. B., Warren, Massachusetts, U.S.A., "Improved apparatus for carburetting air or other gaseous bodies." Nov. 3, 1874.
3799.—Bond, F. T., M.D., Gloucester, "Improvements in deodorizing and disinfecting materials, and in apparatus for applying the same." Nov. 4, 1874.
3804.—Dixon, A., Howard Road, Penge, Surrey, "Improvements in test, try, or gauge cocks for ascertaining the height or level of water or other liquids, or of steam in steam or other boilers or vessels." Nov. 4, 1874.
3807.—Johnson, J. H., Lincoln's Inn Fields, London, "Improvements in apparatus for drawing or raising water or other liquids." A communication. Nov. 4, 1874.

NOTICES TO PROCEED.

2220.—Tackels, C. J., Brussels, Belgium, "Improvements in gas-burners." June 26, 1874.
2330.—Colls, F. W., Erith, Kent, "Improvements in traps for preventing the escape of gases from sewers and drain-pipes." July 3, 1874.
2338.—Wells, J., Wednesbury, Staffs, "Certain improvements in main-cocks for gas and water purposes, but which said improvements are also applicable for main-cocks for the controlling of other fluids." July 4, 1874.
2380.—Bean, E. E., Boston, U.S.A., "A pneumatic electric gas-lighting apparatus." July 7, 1874.
2404.—Cooper, H. E., Bethnal Green Road, London, "Improvements in the means of and in apparatus for carburetting air or gas for illuminating or heating purposes." July 8, 1874.
2434.—Warren, S. H., Crewe, Chester, and Wates, P. J., Greenwich, Kent, "Improvements in machinery and apparatus for charging and drawing retorts." July 11, 1874.
2439.—Schmersahl, A. E., Manchester, Lancs, "Improvements in treating sewage water and other foul liquids for the purpose of purification, and in the manufacture of manure." July 11, 1874.
2496.—Wise, W. L., Chandos Chambers, Adelphi, London, "Improvements in apparatus for purifying and filtering water." A communication. July 16, 1874.
3082.—Cooper, W., Southampton, Hants, "An improved rotary steam-engine and pump." Sept. 8, 1874.
3472.—Scott, H. Y. D., Ealing, Middlesex, "Improvements in the manufacture of ammoniacal salts." Oct. 9, 1874.
3549.—Hamilton, J., Smethwick, Staffs, "Improvements in direct-acting pumps worked by steam or compressed air." Oct. 15, 1874.
3567.—Ashworth, G., and Ashworth, E., Manchester, Lancs, "Improvements in steam-pumps or pumping-engines." Oct. 17, 1874.
3672.—Greenacre, T., Turner's Road, Burdett Road, London, "Improvements in means or apparatus for manufacturing screws of vulcanite or other analogous material for liquid-meters." Oct. 24, 1874.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

1709.—Budenberg, A., Manchester, Lancs, "Improvements in meters for measuring the flow of liquids." A communication. May 14, 1874.
1793.—Matthews, H., Bristol, Gloucester, "Improvements in apparatus for preventing the return or back flow of gas, water, and other fluids in sewers, drains, and other similar situations." June 6, 1874.
1929.—Schanzer, L. I. L., Odessa, Russia, "A new or improved instrument or apparatus for drilling and tapping or screwing mains under pressure, and attaching pipes, cocks, or connexions thereto." June 3, 1874.
2968.—Silber, A. M., Whitecross Street, London, "Improved apparatus for lighting and heating purposes." Aug. 31, 1874.

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GWYNNE & BEALE'S PATENT IMPROVED GAS-EXHAUSTERS,

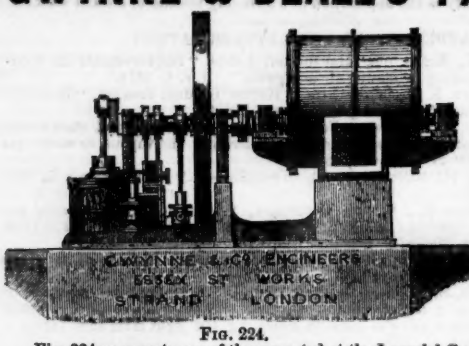

FIG. 224.

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GAS-EXHAUSTING MACHINERY.

(It is NOT CORRECT to state that Mr. BEALE has RETIRED.)

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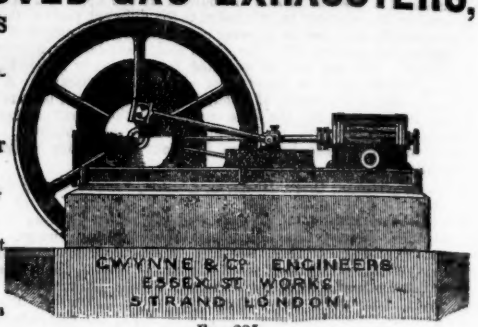

FIG. 225.

Fig. 224 represents one of those erected at the Imperial Gas-Works, Bromley, capable of passing 210,000 cubic feet of gas per hour. Several others of the same size are now on order for the same Company. These Patent Machines combine the highest quality of workmanship and materials, the largest bearings and wearing surfaces, with the most perfect system of action yet discovered. Fig. 225 represents one of a series of four at the Nottingham Gas-Works, each passing 52,500 cubic feet per hour. GWYNNE AND Co. *do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, but to produce Machinery of the very highest quality, and the most approved design and arrangement.* Their prices have been estimated with a due regard to the excellence of the article produced, and when this is taken into consideration, they have no fear for the result. The orders executed this season for Exhausters and alterations to their patented system amount to over 4,000,000 cubic feet of gas passed per hour, and to over 300 horse power for Engines to drive them. In every instance their work is giving the greatest satisfaction. Numerous testimonials and references can be given.

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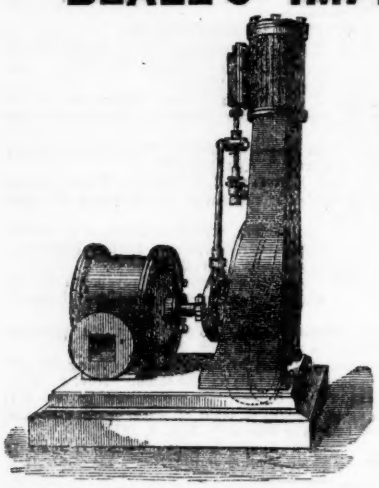
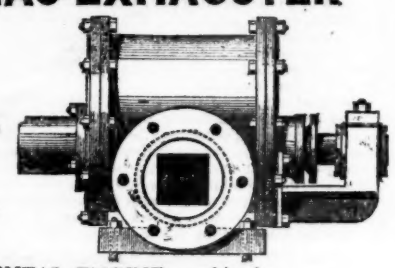


WITH

ENGINE COMBINED

ON

ONE BASE PLATE.



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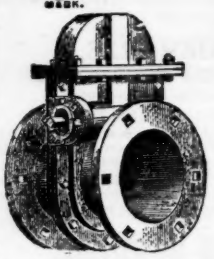

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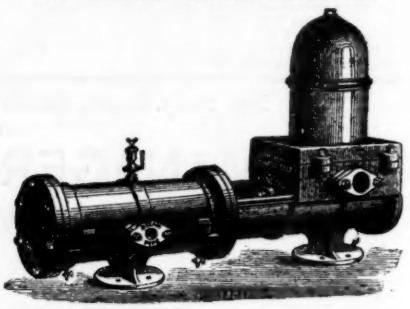

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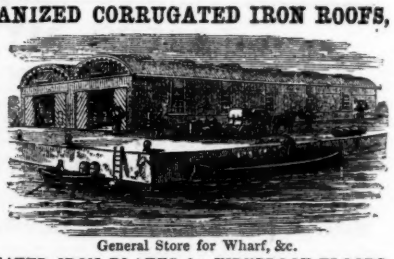

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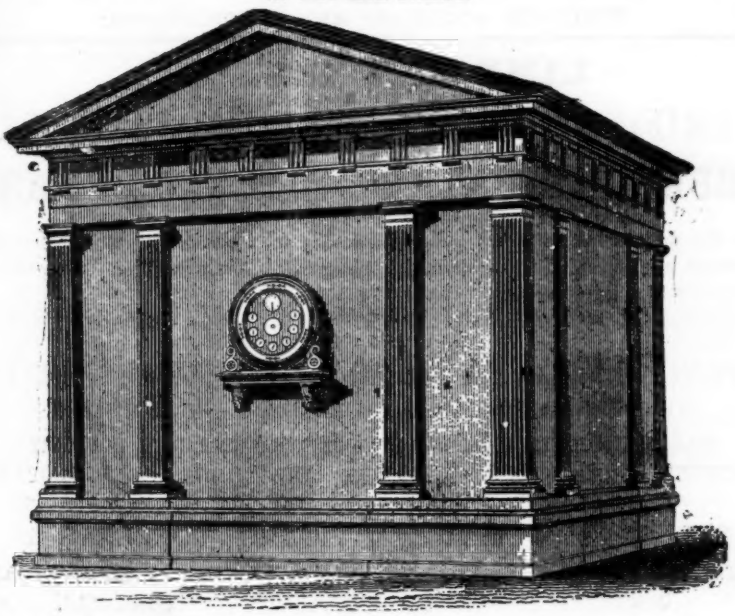

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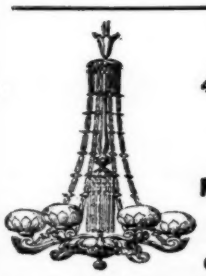

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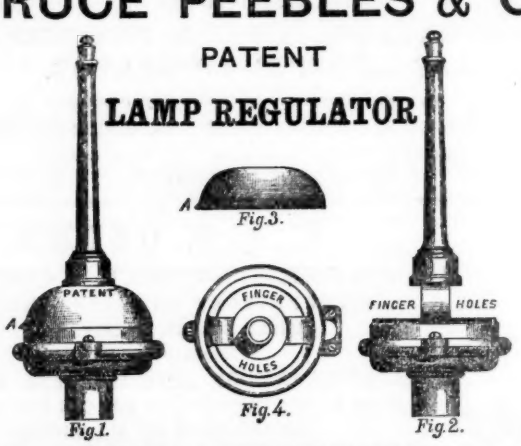

Fig.3. *Fig.1.* *Fig.4.* *Fig.2.*
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Attention is respectfully requested to the following extract from a lecture "On the Economical Combustion of Coal Gas," delivered to the Philosophical Society of Glasgow, by Dr. W. Wallace, F.R.S.E., F.C.S., Gas Examiner for the city of Glasgow, on the 4th of March last:—
"A few years ago, a simple form of Gas Regulator for Street Lamps was introduced, I do not know by whom, and various forms of it, and improvements on it, have been made by many practical gas engineers. Of all the modifications of the instrument, the best in my opinion is that of Mr. D. Bruce Peebles, of Edinburgh; in fact, his Lamp Regulators are so superior that they are likely to supplant all others. Already about 9000 of these have been applied to the street-lamps in Glasgow, and I understand it is the intention of the authorities to introduce them all over the town. The saving thereby effected I calculate to be about £6000 per annum, without any diminution of light. One of the great advantages of Mr. Peebles's apparatus over all others is that it can be regulated while the gas is burning."
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Analysis by F. J. EVANS, Esq., Chartered Gas Company, Horseferry Road, Westminster:—

(COPY.)

	Cubic Feet of Gas per Ton of Coal.	Illuminating Power in Candles.	Coke per Ton of Coal used.	Ash in Coke, per Cent.	Sulphur in Coal, per Cent.
Silkstone Nuts . . .	10·800	15·85	12·66 cwt.....	6·0	0·69

NOTE.—The illuminating power of the gas was tested by the standard burner now used in London by the Gas Referees, under the City of London Gas Act, 1868.

Horseferry Road, Westminster, March, 1870. (Signed) F. J. EVANS.

These Nuts are extensively used by various Gas Companies throughout the Kingdom, who bear strong testimony to their value.

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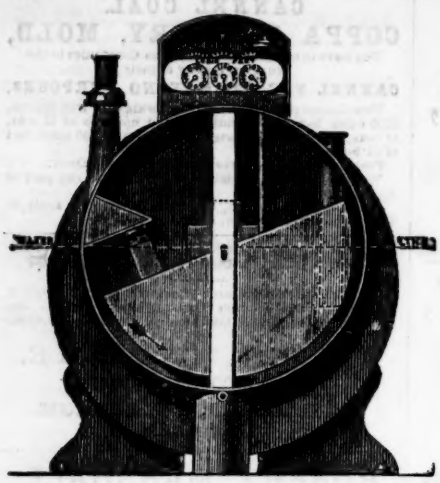

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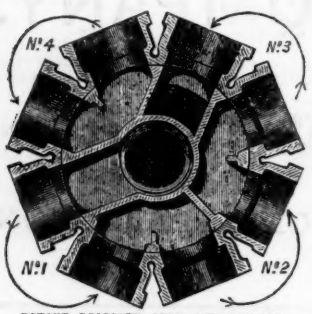

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Sectional Plan.

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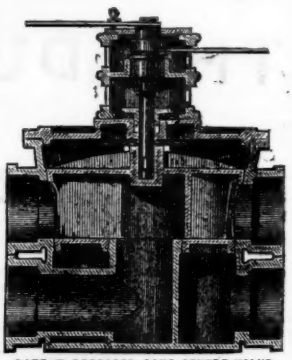
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